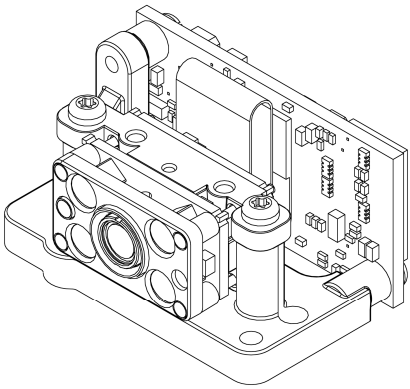
Metrologic®
We really work for you.™

METROLOGIC INSTRUMENTS, INC.

IS4920 Series
Area Imaging Decode Engine
Integration Guide



Copyright

© 2007 by Metrologic Instruments, Inc. All rights reserved. No part of this work may be reproduced, transmitted, or stored in any form or by any means without prior written consent, except by reviewer, who may quote brief passages in a review, or provided for in the Copyright Act of 1976.

Trademarks

Metrologic is a registered trademark of Metrologic Instruments, Inc.
Products identified in this document are hereby acknowledged as trademarks, registered or otherwise, of Metrologic Instruments, Inc. or their respective companies.

TABLE OF CONTENTS

Introduction

Product Overview 1

Models and Accessories 2

Components of the IS4920 Series Assembly (Non-Bracketed) 3

Components of the IS4920 Series Assembly (Bracketed) 4

Components of the IS4910 (Imaging Engine) 5

Components of the Decode PCB (TTL Level RS232) 6

Components of the Decode PCB (USB) 7

Labels 8

Mounting Specifications

IS4910-00 Dimensions 9

IS4910-01 Dimensions 10

IS4910-02 Dimensions 11

Decode Board Dimensions (TTL Level RS232) 12

Decode Board Dimensions (USB) 13

Bracketed Module Dimensions (IS4920) 14

Enclosure Specifications

Electrostatic Discharge (ESD) Cautions 15

Airborne Contaminants and Foreign Materials 15

Output Window Properties 16

Output Window Coatings 16

Optical Clearance Specifications 17

Electrical Considerations 18

Power Supply 18

Host Flex Cable 18

Power Sequencing 18

Design Considerations 19

Thermal Considerations 19

Theory of Operation

Overview 20

Host Interface Signals 21

TABLE OF CONTENTS

Usage of Host Interface Signals 22
Descriptions of IS4920 Power Modes 25

Operational Timing
Power Up/Boot Up 29
Power Down/Suspend/Power Removed 30
Decode Timing 31
Summary of Operation Timings 33

Depth of Field vs Bar Code Element 34

Design Specifications 35
Detailed IS4920 Electrical Specifications 37
Current Waveforms 38

Imaging Engine Terminations
Imaging Engine Interface Connector 41
Flex Cable Pinout – Imaging Engine Connection 42
Flex Cable Pinout - Decode Board Connection 43
Decode Board (USB & TTL) Interface Connector 44
Decode Board (USB) Output to Host Connector 45
Decode Board (TTL) Output to Host Connector 46

Flex Cable Specifications 47
Dimensions 47
Installation Notes 48

Regulatory Compliance
Safety 49
Europe 50
United States 51
Canada 51

Limited Warranty 53

Patents 54

Index 55

Contact Information and Office Locations 57

Product Overview

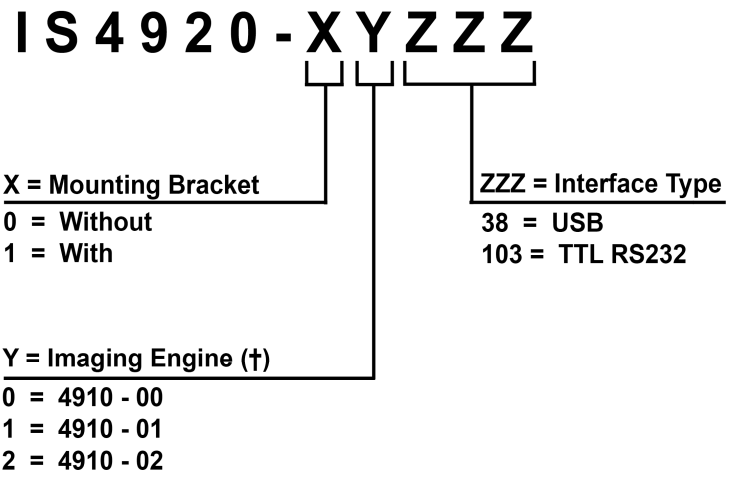
IS4920 is a miniature area imaging decode engine with image capturing and bar code decoding capabilities. The imaging engine contains an area imaging engine (IS4910) and a decode board. The imaging engine features a mega-pixel CMOS sensor, integrated illumination and patented First*Flash*™ technology; together they ensure capturing a high-resolution image with optimal brightness each time. IS4920 also has a wide-angle lens design, which covers a large scan area and delivers a true omni-directional scanning performance. The high-quality images produced by the imaging engine can be used for decoding bar codes, image upload, signature capture, document lifting and reading OCR fonts.

The decode board is powered by a fast processor and Swift*Decoder*™ software to decode a wide array of 1D and 2D bar codes plus OCR fonts. The decode board supports TTL level RS232 or USB 1.1 communication. The decode board is compatible with MetroSet2, a PC-based software for easy configuration and flash upgrade.

IS4920 is designed with the industrial standard size, mounting options and output to facilitate integration into existing applications. The imaging engine's miniature size makes IS4920 ideal for integration into data terminals and other small devices. IS4920 is supplied as an assembled module with a mounting bracket or as separate components for custom mounting. The imaging engine's unique open system architecture allows IS4920 to accept third party and custom plug-ins, giving the IS4920 virtually unlimited application flexibility. The small yet powerful engine delivers a scanning performance that rivals a full-fledged handheld scanner.

Models and Accessories

Part Number Designation


I S 4 9 2 0 - X Y Z Z Z
X = Mounting Bracket
0 = Without
1 = With
Y = Imaging Engine (†)
0 = 4910 - 00
1 = 4910 - 01
2 = 4910 - 02
ZZZ = Interface Type
38 = USB
103 = TTL RS232

† - Imaging Engine Types:

Model		Mounting Option Description
IS4910	-00	• two blind holes for self-tapping screws
	-01	• two blind holes for self-tapping screws • two through holes located on tabs that extend from two sides of the engine's chassis
	-02	• two blind holes for self-tapping screws • threaded inserts located on tabs that extend from two sides of the engine's chassis

Components of the IS4920 Series (Non-Bracketed)

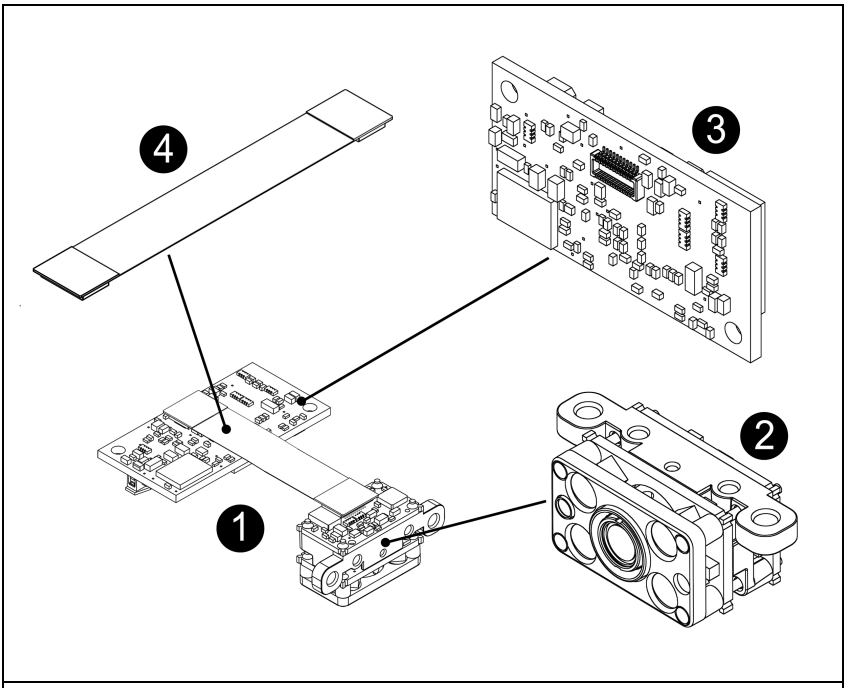


Figure 1. IS4920 Components (Non-Bracketed Version)

ITEM NO.	DESCRIPTION
1	IS4920 Assembly
2	IS4910 Imaging Engine (-01 Shown)
3	Decode Board (p/n 77-77090)
4	Flex Cable (p/n 77-77104)

Components of the IS4920 Series (Bracketed)

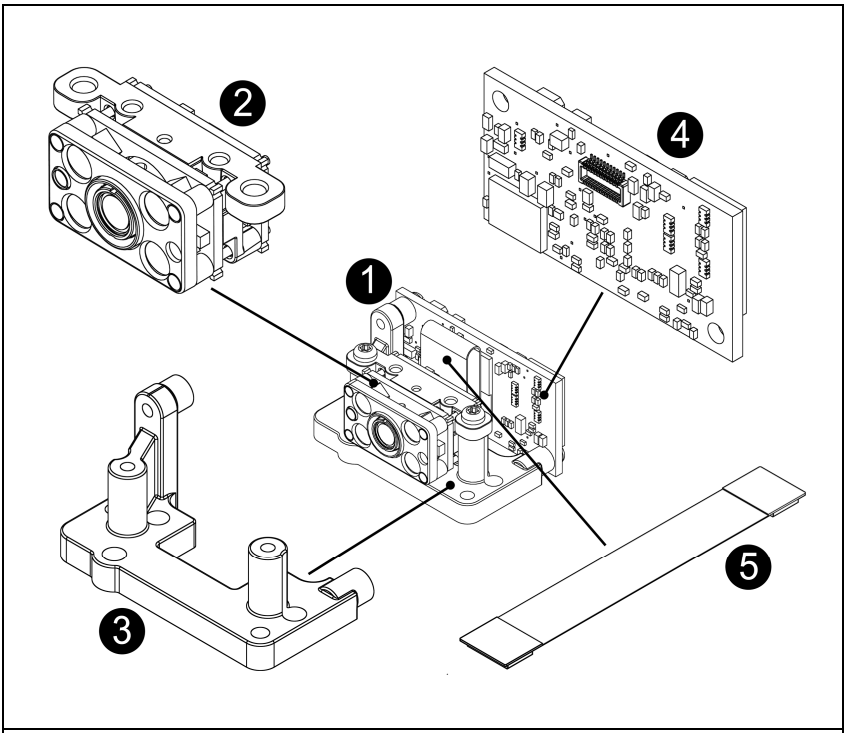
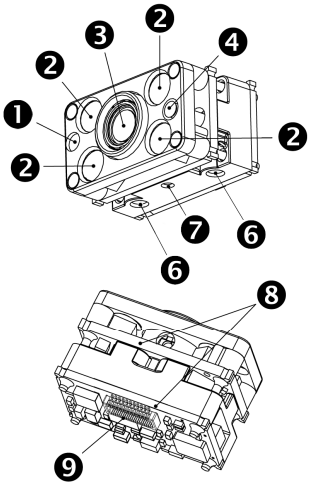


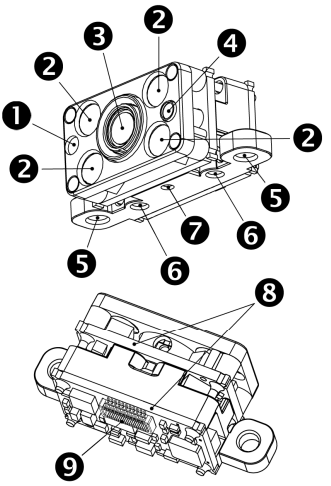
Figure 2. IS4920 Components (Bracketed Version)

ITEM NO.	DESCRIPTION
1	IS4920 Assembly
2	IS4910 Imaging Engine (-01 Shown)
3	Bracket, optional
4	Decode Board (p/n 77-77090)
5	Flex Cable (p/n 77-77104)

Components of the IS4910 (Imaging Engine)



IS4910-00

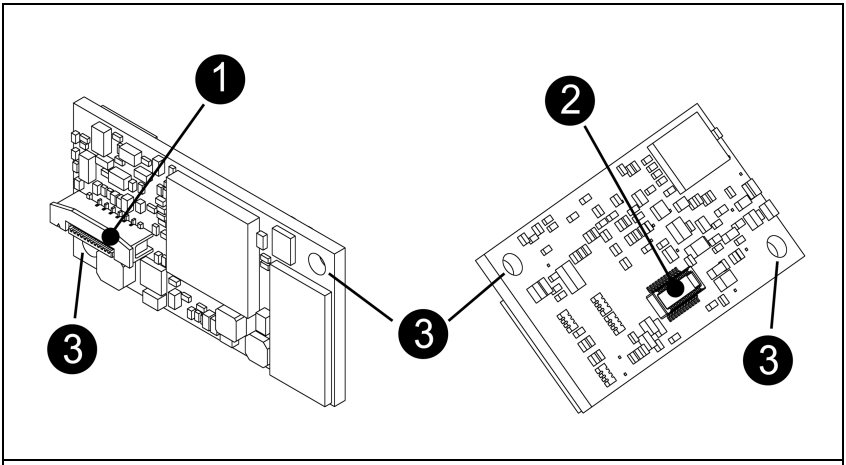


IS4910-01 / IS4910-02

ITEM NO.	DESCRIPTION
1	Targeting
2	Area Illumination
3	Camera Imager
4	First*Flash* Light Pipe
5	Mounting Points (see pages 10 - 11)
6	Mounting Points Provided for Self-Tapping Screw (see pages 9 - 11)
7	Keying Location (see pages 9 - 11)
8	Printed Circuit Boards
9	22-Pin, 0.50 mm (.020") Pitch SlimStack™ Plug, Molex P/N 55560-0227

Figure 3. IS4910 Series Components

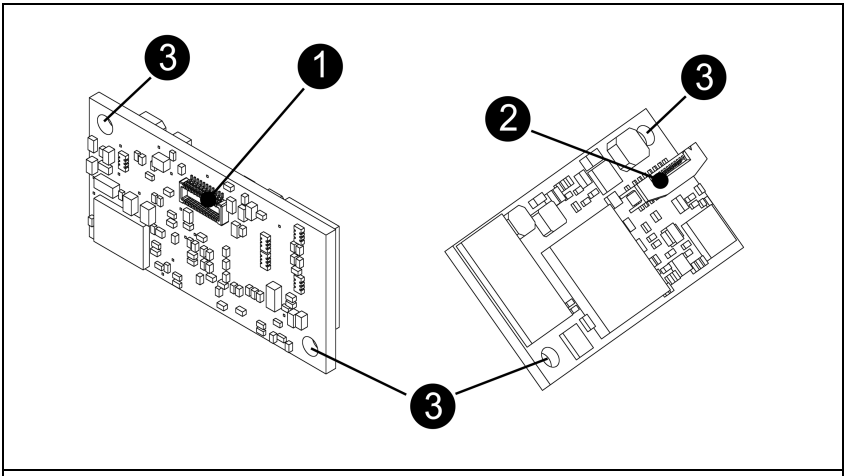
Components of the Decode PCB (TTL Level RS232)



DECODE PCB (TTL LEVEL RS232)

ITEM NO.	DESCRIPTION
1	12 POS FFC Connector .5MM Pitch, Molex P/N: 52559-1252
2	22-Pin, 0.50 mm (.020") Pitch SlimStack™ Plug, Molex P/N: 55560-0227
3	Mounting Points(s) Clearance for M2.2 Thread Forming Screw

Components of the Decode PCB (USB)



DECODE PCB (USB VERSION SHOWN)

ITEM NO.	DESCRIPTION
1	22-Pin, 0.50 mm (.020") Pitch SlimStack™ Plug, Molex P/N: 55560-0227
2	12 POS FFC Connector .5MM Pitch, Molex P/N: 52559-1252
3	Mounting Points(s) Clearance for M2.2 Thread Forming Screw

Labels

The serial number/model number label is located on the side of the engine.

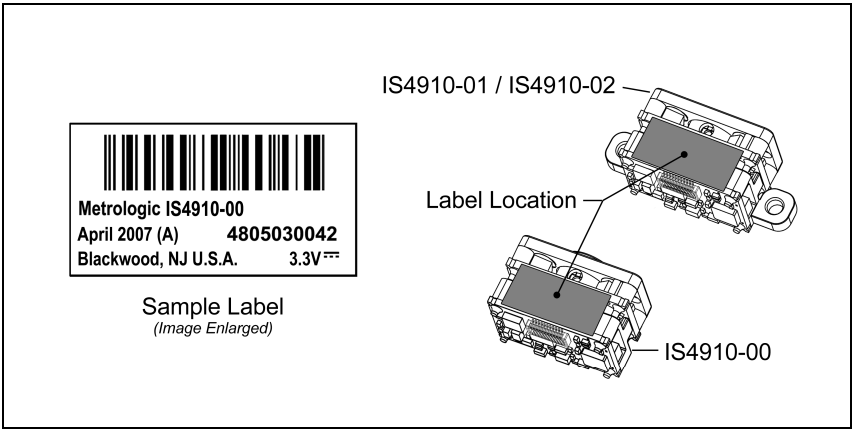


Figure 4. Imaging Module Serial Number Label Sample

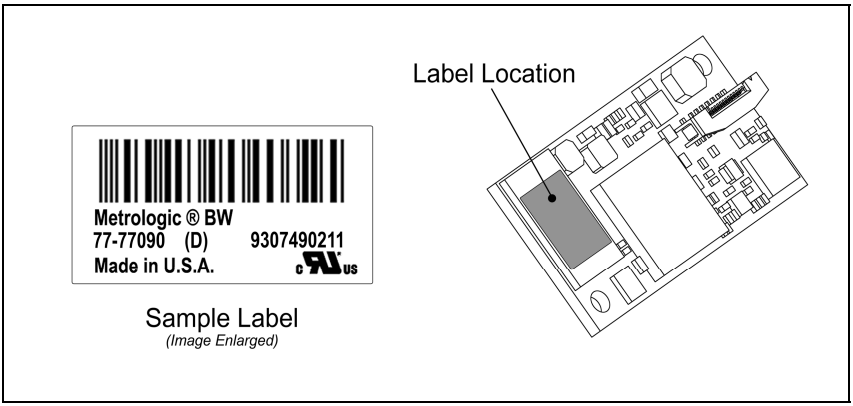


Figure 5. Decode Board (USB Version) Serial Number Label Sample

IS4910-00 Dimensions

The IS4910-**00** model has two blind holes located on the bottom of the engine. These bind holes are provided for applications that require mounting with self-tapping screws. A keying location point is also provided on the bottom of the engine to assist with alignment.

When securing the engine with self-tapping screws, Metrologic recommends:

- using M2.2 x 4.5 Philips Pan Head, Type AB, Steel, Zinc Clear, Trivalent self-tapping screws
- not exceeding 1.75 +0.5 in-lb [2.02 +6 cm-kg] of torque
- a minimum mount thickness of 0.3 mm

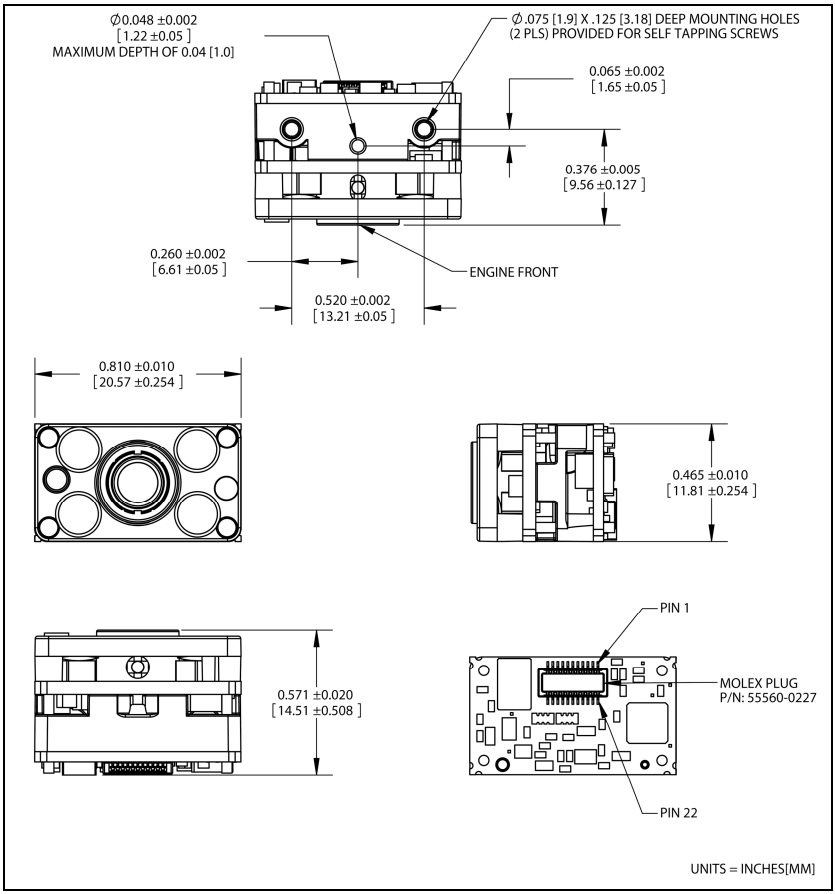


Figure 6. IS4910-00 Dimensions

Specifications are subject to change without notice.

IS4910-01 Dimensions

The IS4910-**01** model has two blind holes located on the bottom of the engine for use with self-tapping screws. This model includes two additional clearance holes located on tabs extended from the sides of the engine's chassis. A keying location point is provided on the bottom of the engine to assist with alignment.

When securing the engine with self-tapping screws, Metrologic recommends:

- using M2.2 x 4.5 Philips Pan Head, Type AB, Steel, Zinc Clear, Trivalent self-tapping screws
- not exceeding 1.75 +0.5 in-lb [2.02 +6 cm-kg] of torque
- a minimum mount thickness of 0.3 mm

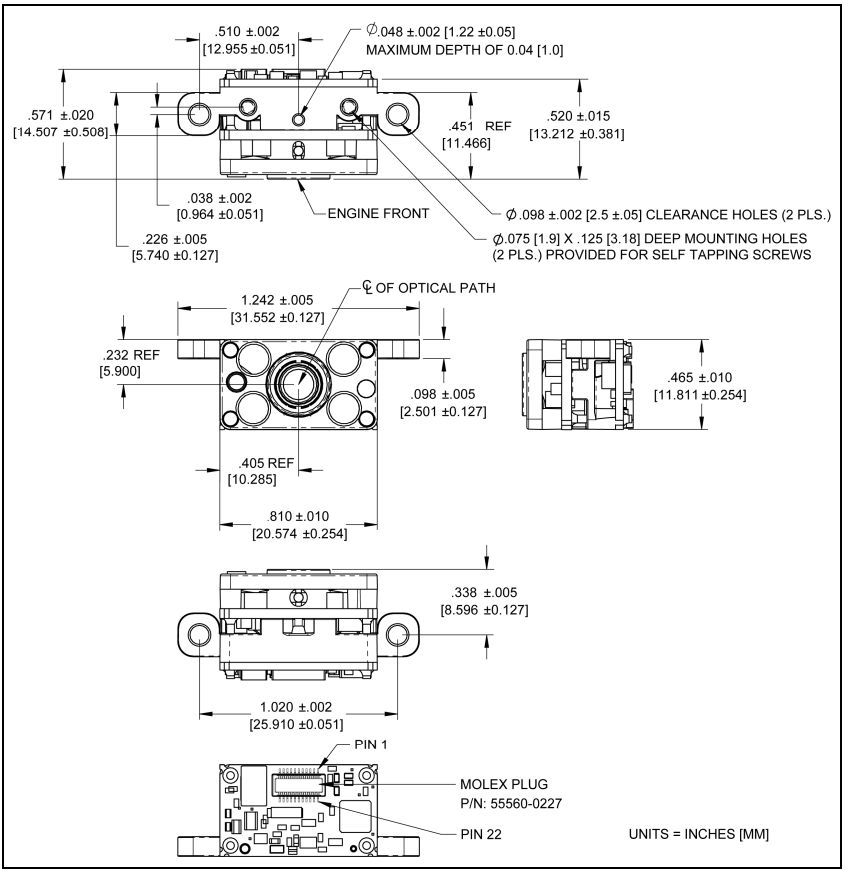


Figure 7. IS4910-01 Dimensions

Specifications are subject to change without notice.

IS4910-02 Dimensions

The IS4910-**02** model has two blind holes located on the bottom of the engine for use with self-tapping screws. This model includes two additional threaded inserts located on tabs extended from the sides of the engine's chassis. A keying location point is provided on the bottom of the engine to assist with alignment.

When securing the engine with self-tapping screws, Metrologic recommends:

- using M2.2 x 4.5 Philips Pan Head, Type AB, Steel, Zinc Clear, Trivalent self-tapping screws
- not exceeding 1.75 +0.5 in-lb [2.02 +6 cm-kg] of torque
- a minimum mount thickness of 0.3 mm

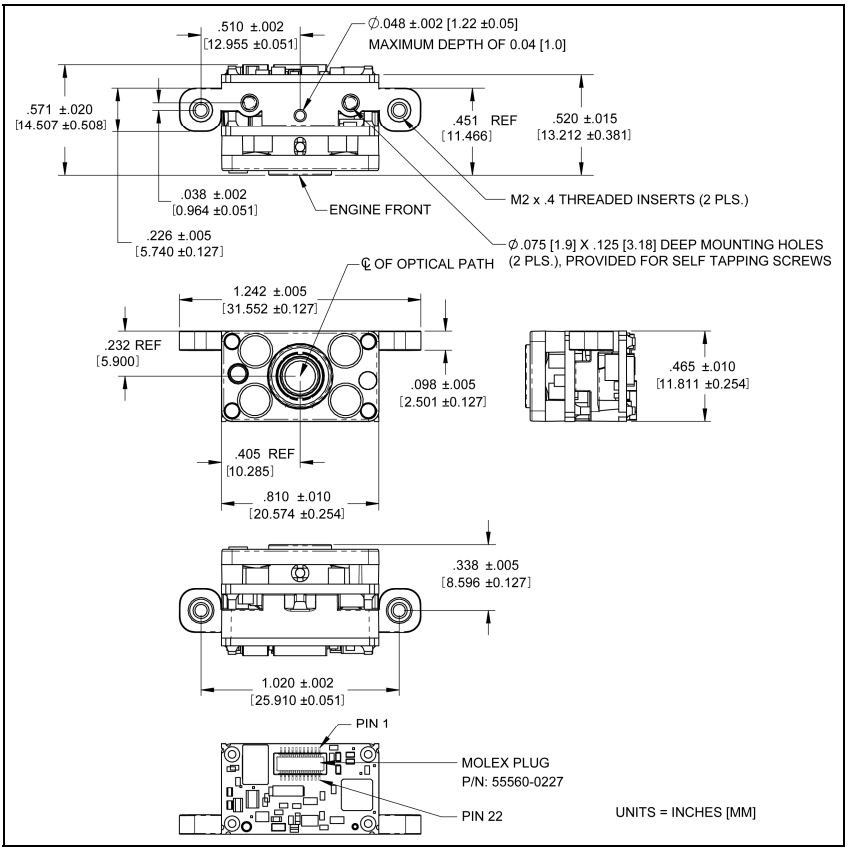


Figure 8. IS4910-02 Dimensions

Specifications are subject to change without notice.

Decode Board Dimensions (TTL Level RS232)

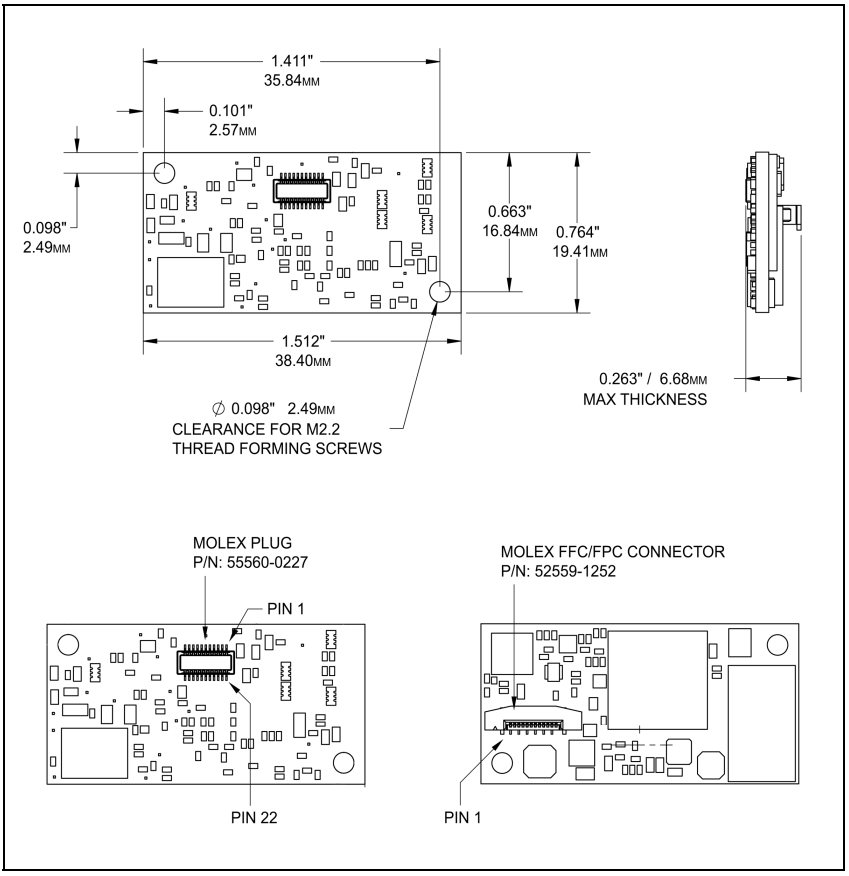


Figure 9. Decode Board (TTL Level RS232) Dimensions

Specifications are subject to change without notice.

USB Decode Board Dimensions

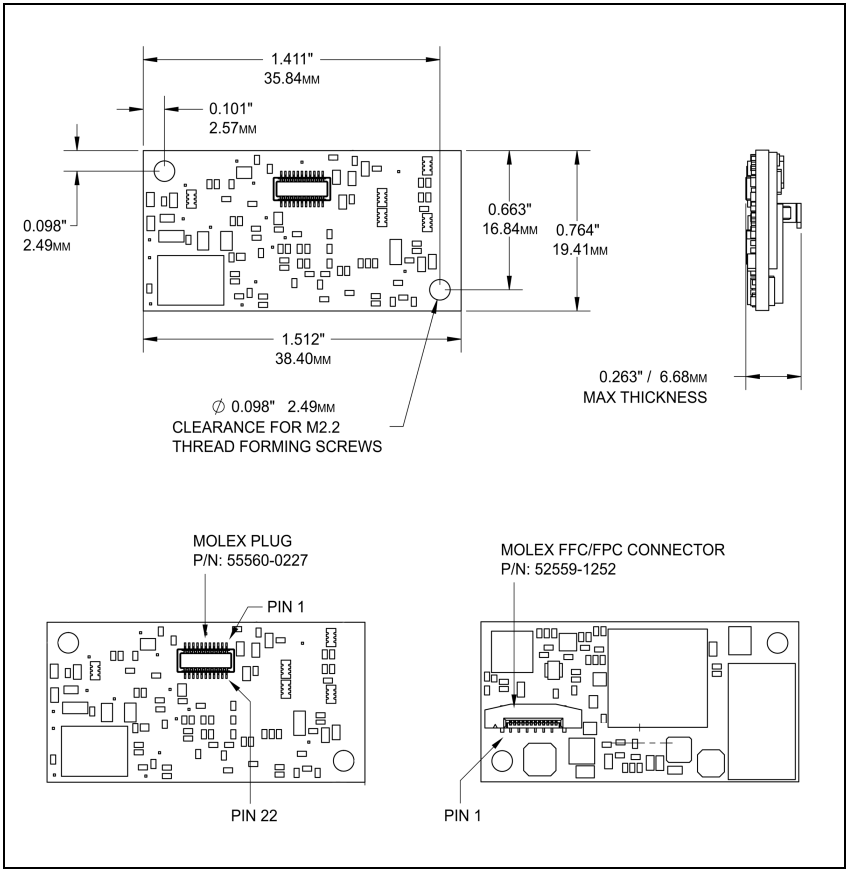


Figure 10. Decode Board (USB) Dimensions

Specifications are subject to change without notice.

Bracketed Module Dimensions

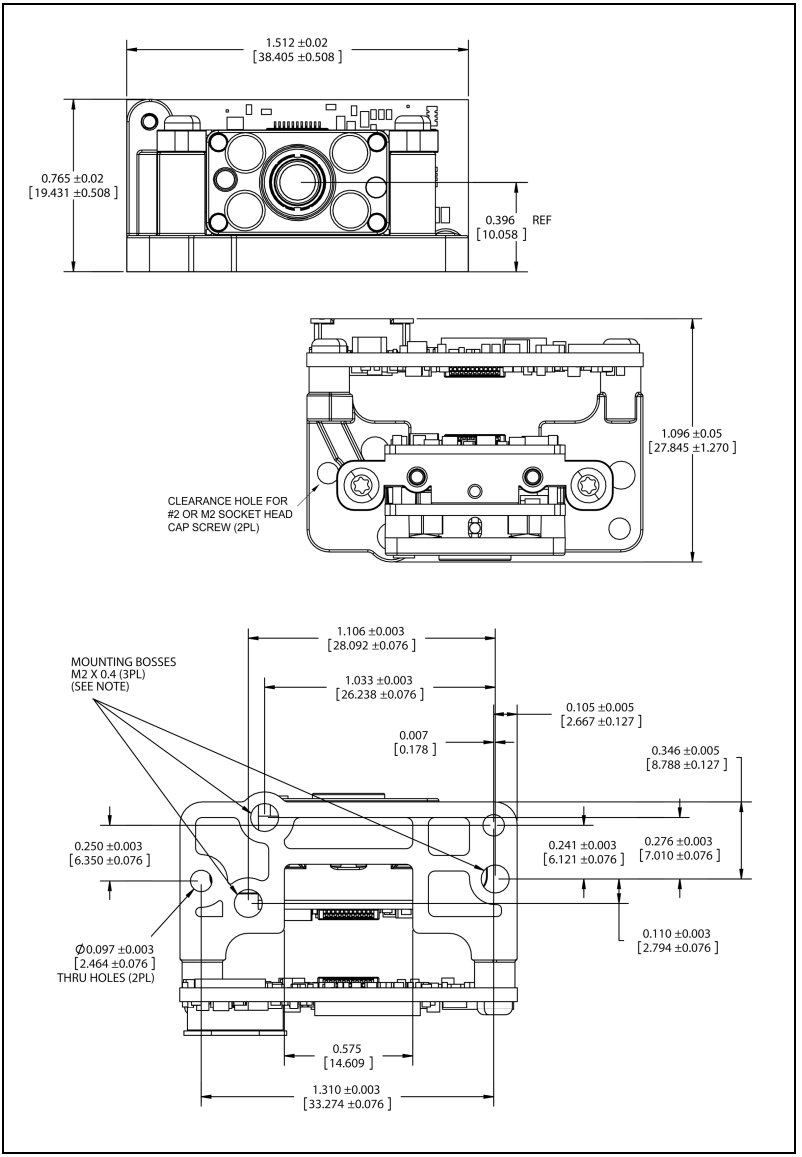


Figure 11. IS4920 Bracketed Module Dimensions

Specifications are subject to change without notice.

Enclosure Specifications

The IS4920 imaging engine series was specifically designed for integration into custom housings for OEM applications. The imaging engine's performance will be adversely affected or permanently damaged when mounted in an unsuitable enclosure.

> **The limited warranty (on page 53) is void** if the following considerations are not adhered to when integrating the IS4920 series area-imaging engine into a system.

Electrostatic Discharge (ESD) Cautions

All IS4920 imaging engines are shipped in ESD protective packaging due to the sensitive nature of the engine's exposed electrical components.

- ALWAYS use grounding wrist straps and a grounded work area when unpacking and handling the engine.
- Mount the engine in a housing that is designed for ESD protection and stray electric fields.

> ESD has the ability to modify the electrical characteristics of a semiconductor device, possibly degrading or even destroying the device. ESD also has the potential to upset the normal operation of an electronic system, causing equipment malfunction or failure.

Airborne Contaminants and Foreign Materials

The imaging engine has very sensitive miniature electrical and optical components that must be protected from airborne contaminants and foreign materials. In order to prevent permanently damaging the imaging engine and voiding the limited warranty (on page 53), the imaging engine enclosure must be:

- Sealed to prevent infiltration by airborne contaminants and foreign materials such as dust, dirt, smoke, and smog.
- Sealed to protect against water, humidity and condensation.

Refer to page 18 for information on power and thermal considerations.

Output Window Properties

> An improperly placed window has the serious potential to reduce the imaging engine's performance. Careful consideration must be made when designing the output window's distance and angle relative to the imaging engine's camera aperture.

Follow these guidelines when designing the output window.

- The output window material should have a spectral transmission of at least 85% from 580 nm to 680 nm and should block shorter wavelengths.
- The output window should have a 60-40 surface quality, be optically flat, clear, and free of scratches, pits, or seeds. If possible, recess the window into the housing for protection or apply a scratch resistance coating (see *Output Window Coatings* below).
- Apply an anti-reflective coating to the window surfaces to reduce the possibility of reflective light interfering with the engine's performance.
- The clear aperture of the output window should extend beyond the 50° Field of View (see page 34).
- The window size must accommodate the illumination and targeting areas shown on page 17.
- The window must be parallel to the engine face.
- The distance from the engine face to the inside surface of the window of the enclosure must not exceed 2 mm (0.08") due to possible specular reflections from internal area illumination.

Output Window Coatings

- Anti-Reflection
  An anti-reflective coating can be applied to the inside and/or outside of the window to reduce the possibility of internal beam reflections interfering with the performance of the engine. If an anti-reflective coating is applied, the coating is recommended the coating be on both sides of the window providing a 0.5% maximum reflectivity on each side from 600 - 700 nanometers at the nominal window tilt angle. The coating must also meet the hardness adherence requirements of MIL-M-13508.
- Polysiloxane Coating
  Applying a polysiloxane coating to the window surface can help protect the window from surface scratches and abrasions that may interfere with the performance of the engine. Recessing the window into the housing can also provide added protection against surface damage such as scratches and chips. If an anti-reflective coating is used, there is no need to apply a polysiloxane coating.

Optical Clearance Specifications

The window size and enclosure design must provide unobstructed clearance for the *illumination and targeting areas* shown below to avoid optical interference that decreases the engine's performance.

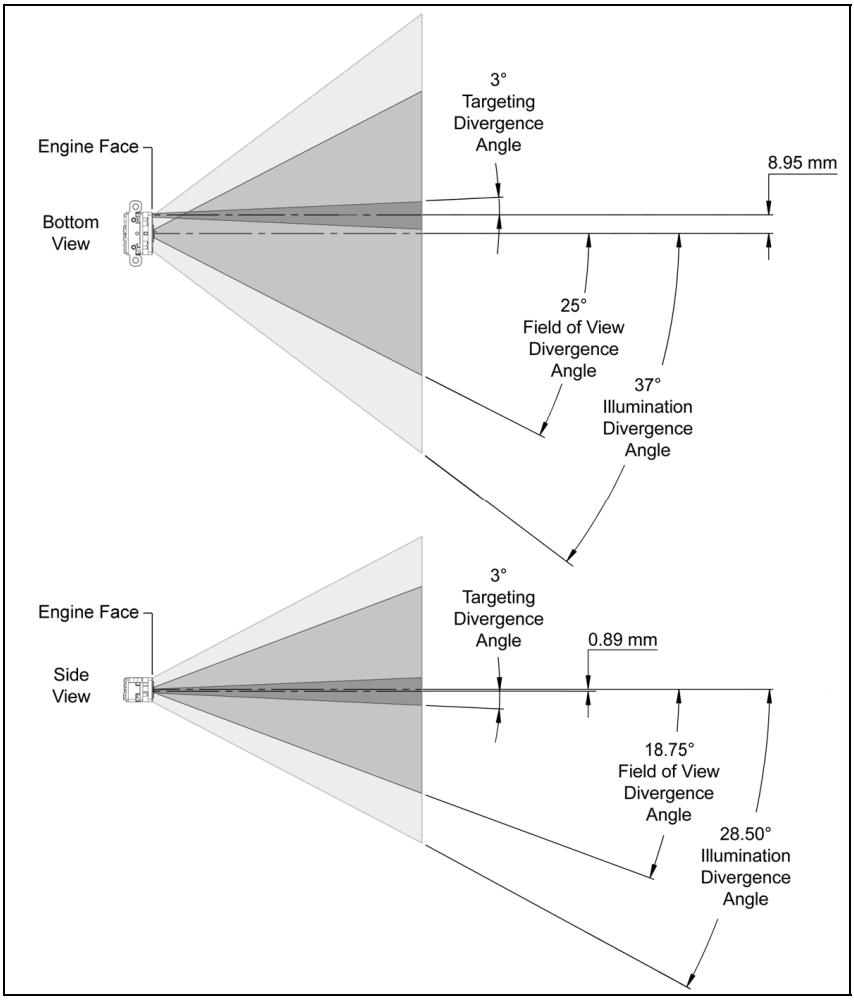


Figure 12. IS4900 Series Optical Clearance Specifications

Specifications are subject to change without notice.

In order to ensure proper operation of the IS4920's electrical system, care must be taken to ensure the following requirements are met.

Power Supply *

The IS4920 is powered from the host device via the VIN and GND pins of the ZIF connector on the decode board. This voltage must be maintained within the specified voltage range (see electrical specs) at the decode board. Thus, voltage drops in the flex cable must be taken into account. In addition, this power must be clean and heavily decoupled in order to provide a stable power source. Note, that when the illumination LEDs are enabled, the input current will increase considerably (see current waveforms) thus, the power supply must be able to handle dynamic current loads.

Host Flex Cable

The host flex cable is used to carry power and data signals between the IS4920 and the host system. As indicated in the previous section, this cable should allow for minimal voltage drop and maintain good ground connection between the host and the IS4920 engine. In terms of grounding and voltage drop, a shorter cable is better.

In addition to power, this cable will also carry the digital signals required for communication. The cable design is especially important in the case of USB due to the relative high speed of the USB signals. As such, the impedance of the cable should match, or close as possible to, the impedance of the USB driver (approximately 45 ohms per trace).

In addition to cable length and trace geometry, the routing of this cable also plays a critical role in system design. This cable should be routed away from high frequency devices as these frequencies can couple onto the flex cable and cause potential data corruption or unwanted EMI.

Power Sequencing*

The IS4920 is powered from the VIN power signal on the ZIF connector on the decode board. Most of the host signals (signals present on the ZIF connector) are relative to this voltage. Not all of these signals are overvoltage tolerant thus; care must be taken to ensure that the relationship between VIN and the host signals are always met (see electrical characteristics).

* *See page 41 for additional information on electrical specifications.*
See pages 41 and 47 for additional information on the engine and flex cable pinouts.

Thermal Considerations

The IS4920 is qualified over the specified operational temperatures (0°C to 40°C) for all operating modes. Care must be taken to ensure that ambient temperatures do not exceed this range in order to guarantee operation. Operating the IS4920 in continuous mode for an extended period may produce considerable heating. This mode should be limited and sufficient airflow should be provided whenever possible to minimize internal heating. Excessive heating may degrade images and potentially damage the IS4920 engine.

See pages 41 and 47 for additional information on the engine and flex cable pinouts.

General Overview

The IS4920 is a small area imaging barcode scanning engine designed for integration into handheld portable data terminals or other OEM devices specifically for the barcode scanning and/or OCR applications. The IS4920 functions like a digital camera and increases functionality and value to an OEM product by adding additional capabilities such as digital image capture, decoding of all standard 1D & 2D barcodes, reading OCR fonts, document lift, signature capture, etc.

The IS4920 scanning engine consists of two main system components: the miniature IS4910 imaging engine, which utilizes a high-resolution CMOS image sensor, and a small decode board that contains a powerful microprocessor and the firmware to control all aspects of the engine's operations and provide a means of communication with the host system over the standard set of communication interfaces.

The model IS4920-*xx*103 provides communication with the host system over TTL-level RS232 communication interface. Contact a customer service representative at 1-800-ID-METRO or 1-800-436-3876 for availability.

The model IS4920-*xx*38 provides communication with the host system over USB. It can be configured for the following protocols of USB communication:

- USB Keyboard Emulation Mode (default)
- USB Serial Emulation Mode

The system hardware architecture of the IS4920 scanning engine is shown on the figure below.

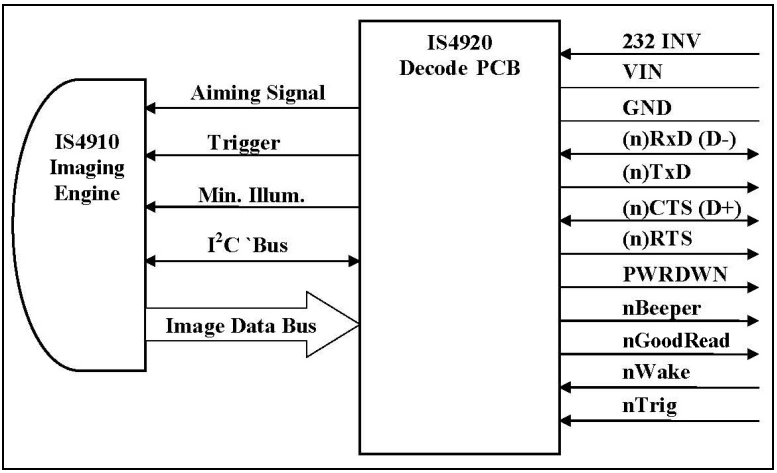


Figure 13. IS4920 System Architecture

The host interface signals are described in the table below.

Pin #	IS4920-*xx*103 (TTL RS232)	IS4920-*xx*38 (USB)	Description
1	232INV	NC	Input: TTL RS232 polarity control with 68k ohm pull-up. Connect to ground for UART to UART signal polarity. Pull up to Vin or leave unconnected for standard TTL RS232 polarity.
2	V_{in}	V_{in}	Power: Supply voltage input (3V to 5.5V)
3	GND	GND	Ground: Power and signal ground.
4	(n)RxD	D-	Input: TTL Level RS232 Receive data input. Polarity determined by Pin1 Bidirectional: USB D- Signal
5	(n)TxD	<reserved>	Output: TTL Level RS232 transmits data. Polarity Determined by Pin 1
6	(n)CTS	D+	Input: TTL level Clear to Send. Polarity configurable via software Bidirectional: USB D+ signal
7	(n)RTS	<reserved>	Output: TTL level RS232 Request to Send. Polarity configurable via software
8	PWRDWN	PWRDWN	Output: Open drain, 100K pull up; active high indicates that the IS4920 is in power down mode.
9	nBEEPER	nBEEPER	Output: Open drain, 100K pull up; active low signal capable of sinking current. PWM controlled AC signal can be used to drive an external beeper.
10	nGoodRead	nGoodRead	Output: Open drain, 100K pull up; active low signal for sinking current of a Good Read LED circuit.
11	nWAKE	nWake	Input: 100K pull up; active low, the signal can be used to bring the scanner out of power-down (TTL RS232 version only) or sleep mode (TTL RS232 and USB versions).
12	nTrig	nTrig	Input: Weak pull up; active low, the signal can be used as a trigger input to activate the IS4920.

Since many host systems and applications have unique formats and protocol requirements, the IS4920, just like all other Metrologic scanners, supports a wide range of configurable features that may be selected by scanning a corresponding scanner-programming barcode from MetroSelect Single Line Configuration Guide and Area Imaging Barcode Supplemental Configuration Guide, both available for download from the Metrologic web-site www.metrologic.com.

Usage of the Host Interface Signals

In the default "multi-try" trigger mode of operations, the scanning engine is activated by the nTrig signal, which must be kept active (low) until the successful scan is achieved, as indicated by the nGoodRead signal.

Upon a successful scan, the IS4920 asserts the nGoodRead signal and keeps it asserted (low) for the duration of transmission of the decoded data to the host, or for the minimum of 100 msec (configurable to 50 msec), which coincides with the duration of the nBEEPER signal.

The nGoodRead and nBeeper signals are driven with LVC family open drain outputs powered 3.3V typical and pulled up on the decode board with 100K resistors. The default state of these pins is Hi-Z (pulled up via 100K) and these signals are capable of sinking up to 24mA each when driven to the low state. For beeper applications, care must be taken to ensure that inductive spikes do not cause the voltage on the lines to exceed the maximum voltage of 5.5V.

At any given time, the IS4920 can be in one of the following power modes:

- Boot Mode
- Operating Mode
- Idle Mode
- Sleep Mode
- Presentation Wakeup Mode
- Power-down Mode (TTL Decode Only)
- Suspend Mode (USB Decode Only)

When the scanner is in the Sleep or Presentation Wakeup Mode, the nWake or nTrig signals can be used to wake up the scanner.

The nWake signal wakes up the scanner and turns the scanner into the Idle Mode, which in the IS4920-xx103 TTL RS232 version enables communication with the host for a short period of time defined by the value of the sleep timeout, which is set to 1 second by default. (Note that in the IS4920-xx38 USB version configured for USB Serial Emulation Mode, communication with the host is enabled even when the scanner is in the Sleep or Presentation Wakeup Mode.)

The nTrig signal not only wakes the scanner up, but also immediately activates and turns the scanner into the Operating Mode.

Either nWake or nTrig signals can be used to restart the IS4920-xx103 scanning engine when the engine is in Power-down Mode, which is indicated by the asserted (high) PWRDWN signal.

The PWDWN pin is used to indicate when the IS4920 is in various operating modes such as Power Down, Suspend, and Boot.

Note: The output signals from the IS4920 can experience analog behavior when VIN is initially applied or removed due to the fact the supply voltage is ramping up or down. Care must be taken to ensure that this behavior does not adversely affect the host System. Special attention must be given to the PWRDWN PIN. When power is initially applied, the output state of this line will be indeterminate for about 10mS until the USB controller exits reset. This state of this pin should be disregarded during this time. The following waveforms show several signals when VIN is first applied (*Figure 14*) and when VIN is removed (*Figure 15*).

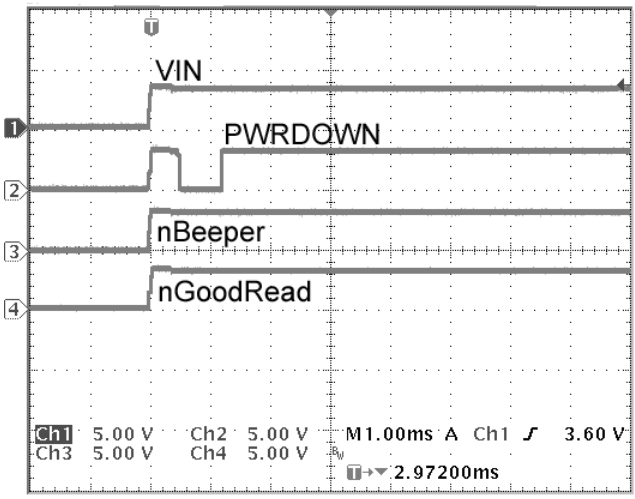


Figure 14. VIN First Applied

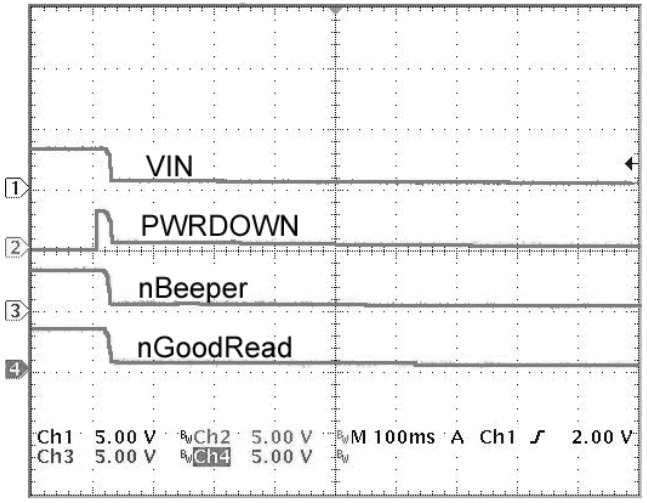


Figure 15. VIN Removed

Descriptions of IS4920 Power Modes

Boot Mode
The scanner is booting up.

PWRDWN Pin State: Asserted (HIGH).

Transition *to* Boot Mode:

- The IS4920-xx103 TTL RS232 scanner is turned to Boot Mode from Power-down Mode when the power is applied AND upon reception of the nTrig or nWake signals.
- The IS4920-xx38 USB enters Boot Mode upon completion of USB enumeration.
- The scanner can turn itself to Boot Mode from Operating or Idle mode upon some internal event, such as at the end of the software upgrade procedure.

At the end of the boot-up cycle the scanner turns to the Idle Mode and de-asserts the PWRDWN pin.

Operating Mode
The scanner is acquiring and processing images or running other tasks.

PWRDWN Pin State: De-asserted (LOW).

Transition *to* Operating Mode:

- The scanner is turned to Operating Mode from Idle, Sleep, or Presentation Wakeup Modes upon the reception of the nTrig signal.
- The scanner can be turned to Operating Mode from Idle Mode (or Sleep Mode) upon the reception of a special single-byte serial command from the host. The byte value is configurable.
- The scanner is turned to Operating Mode from the Presentation Wakeup Mode upon the object detection event.

Idle Mode
The scanner is not operating, but not sleeping and is fully powered. The CPU and image sensor are in the idle mode, the wakeup from which does not require the image sensor reprogramming.

PWRDWN Pin State: De-asserted (LOW).

Transition *to* Idle Mode:

- The scanner is turned to Idle Mode from Operating Mode immediately when no tasks are running in the scanner.

- The scanner is turned to Idle Mode from Sleep or Presentation Wakeup Modes upon the reception of the nWake signal.

Sleep Mode
The scanner is sleeping, but is fully powered. The CPU is in sleep mode. The image sensor is in standby mode, the wakeup from which requires the image sensor reprogramming (which is done automatically in the scanner software).

PWRDWN Pin State: De-asserted (LOW).

Transition *to* Sleep Mode:

- The scanner is turned to Sleep Mode from Idle Mode upon the expiration of the “sleep” timeout, which is set to 1 second by default. The “sleep” timeout is restarted every time the scanner enters the Idle Mode.

- The scanner can be turned to Sleep Mode from Operating Mode or Idle Mode immediately upon the reception of a special single-byte serial command from the host. The byte value is configurable.

Power-down Mode (TTL RS232 Decode Only)
The power of the scanner is turned off.

PWRDWN Pin State: Asserted (HIGH).

Transition *to* Power-down Mode:

- The scanner is turned to Power-down Mode from Sleep Mode upon the expiration of the “power-down” timeout, which is set to 10 minutes by default. The “power-down” timeout is restarted every time the scanner enters the Sleep Mode.

- The scanner can be turned to Power-down Mode immediately upon the reception of a special single-byte serial command from the host. The byte value is configurable.

The scanner can wake up from Power-down Mode and reboot:

- Upon reception of the nTrig or nWake signals.

Suspend Mode (USB Decode Only)
The scanner is in its lowest power consumption state..

PWRDWN Pin State: Asserted (HIGH).

Transition *to* Suspend Mode:

- The scanner is turned to Suspend Mode upon receiving the USB Suspend signal from the USB host.
- The scanner can be turned to Suspend Mode any time (by the USB host).

The scanner can wake up from Suspend Mode and reboot:

- Upon receiving the Resume signal from the USB host.

The following section describes the timing associated with the various operating modes of the IS4920 including Power up, Power down, and Decoding (from idle or Sleep). The waveforms shown in this section assume VIN = 3.3V, Good Read pulled up with 10K resistor to VIN, and Beeper pulled up with 10K resistor to VIN.

Power Up / Boot Up

The power up sequence of the IS4920 depends on the interface type. For the IS4920-USB version, a USB Microcontroller controls the power to the decoding platform and imaging engine via a power switch. When power is initially applied, only the USB controller is active and begins the process of enumeration. Once enumeration is complete, the USB controller turns power on to the imaging engine and decoding platform. As a result, powering up the scanner is completely controlled by the on board USB controller per the USB spec. In this version, only idle and sleep modes are supported. For additional power savings, the unit must be placed in Suspend per the USB specification. The following waveform shows the power up sequence of the USB version of the IS4920.

Note: The PWNDWN signal remains high until the Decode platform transitions to idle mode and is ready to accept commands. In the USB version, the PWNDWN pin will only be high during this boot up condition or when the Decode enters, suspend mode. From this waveform, it can be seen that the entire boot up sequence takes approximately 9 seconds.

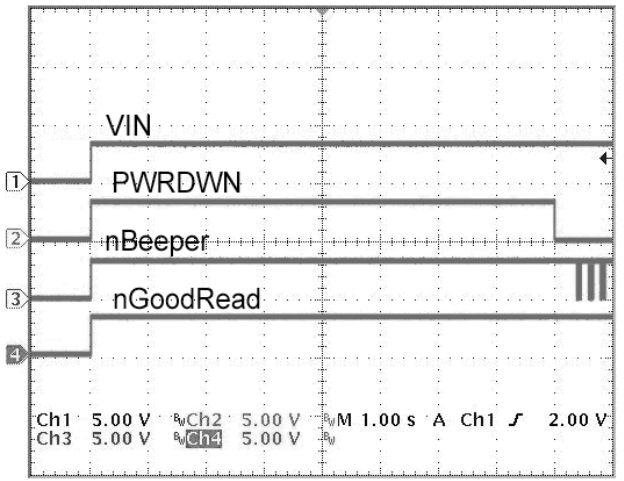


Figure 16. Power Up Sequence of USB Version

The TTL version of the IS4920 does not have an on board microcontroller to control the power to the decode platform. As such, the power can only be supplied to the decoding platform in response to a signals applied by the host (Trigger or Wake). On power up, if both of these signals are high the power will not be applied to the decoding platform and the board will be in the Power Down mode. The Power Down signal will be high and all other host I/O will be in the idle state. In order to apply power to the decode either the Trigger or Wake signal need to be held low until the Decode processor can take over control of the power switch. Once the decoding processor takes control of the switch, the Power Down signal will be brought low and the Trigger and Wake signals can be used with out interrupting the power.

Power Down / Suspend / Power Removed

At any time VIN can be completely removed from the IS4920 however, care must be taken to avoid removing power during Boot up, Flash upgrade, or Configuration change as this could cause corruption to the Flash memory and result in Program and or Configuration corruption. *Figure 15* shows several host signals during a power remove condition for the USB.

The IS4920-TTL enters into the power down state in which power to the decode platform and imaging engine is removed. The decoding processor can initiate a power down sequence one the software configurable power down time has elapsed. Note, the device will only enter power down if the Trigger and wake signals are high.

The IS4920-USB can be placed into suspend mode via the USB suspend signal in order to achieve low current consumption. When this occurs, power is removed to the decoding platform and imaging engine.

Decode Timing

In the IS4920 image acquisition / decoding can occur from either the idle state or the sleep state. This process is initiated by asserting the nTrig signal (or serial command when in the idle state). Once the trigger signal is received, the image sensor is reset and image integration begins. During image integration, the illumination LEDs are enabled for a time determined by the First Flash circuitry on the IS4910 engine. The image is then transferred to the processor and decoded. Upon decoding the image, the processor asserts the nGoodRead signal (low) and beings transmitting the decoded data. When the IS4920 receives a trigger signal while in the sleep state, an additional delay is needed for the decoding to processor exit sleep mode and reconfigures the sensor. The following waveforms show the amount of time required for decoding when a nTrig signal is asserted in both the idle state (*Figure 17*) and Sleep State (*Figure 18*).

Note: the total image acquisition / decode time can be approximated by measuring the time from the nTrig signal going low to the nGoodRead signal going low. This time will vary slightly based on several factors including code quality, code type, and distance from the engine. The following waveforms show a typical condition.

nTrig signal must be kept low for at least 20msec.

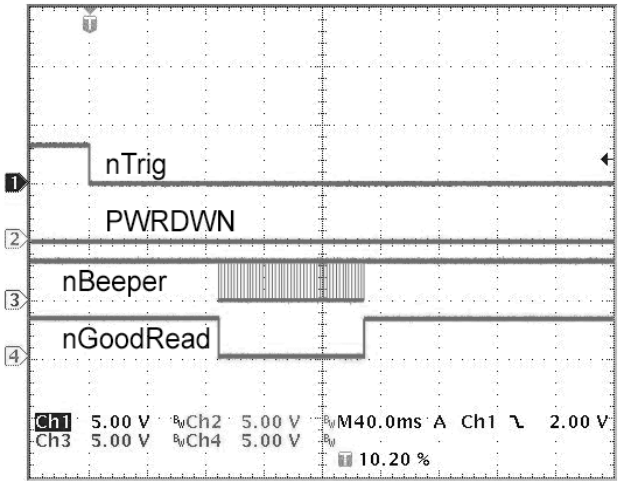


Figure 17. Decode time of received trigger signal in Idle Mode.

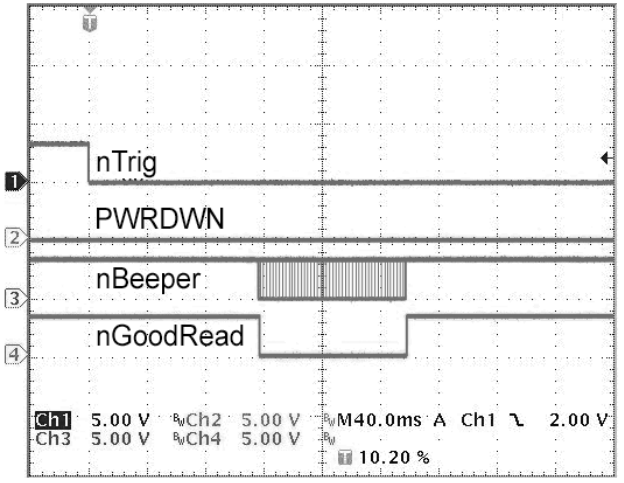


Figure 18. Decode time of received trigger signal in Sleep Mode.

Summary of Operation Timings

Operation Timing Specifications		
Parameter	**Description**	**Typical**
Tprw_up	Power Applied to Processor Ready Delay (USB)	9 Seconds
Tprw_up_ttl	Trigger or Wake Low to Processor Ready Delay (TTL)	TBD
Tdec_idle	Trigger Low to Decode complete Delay (Note 1 and 2)	90msec
Tdec_sleep	Trigger Low to Decode complete Delay (Note 1 and 3)	120msec
Trig_min	Minimum duration of trigger signal	20msec
Note 1	Timing is the Same for Both TTL or USB version	
Note 2	Processor is in Idle state when Trigger signal received	
Note 3	Processor is in Sleep state when Trigger signal received	

Bar Code Element Width			Depth of Field* (In the Field of View)		
			Start (From Engine Face)	End (From Engine Face)	Total
1D	.127 mm	5 mil	50 mm (2.0")	145 mm (5.7")	95 mm (3.7")
	.254 mm	10 mil	30 mm (1.2")	210 mm (8.3")	180 mm (7.1")
	.330 mm	13 mil	25 mm (1.0")	310 mm (12.2")	285 mm (11.2")
PDF	.127 mm	5 mil	45 mm (1.8")	160 mm (6.3")	115 mm (4.5")
	.254 mm	10 mil	25 mm (1.0")	270 mm (10.6")	245 mm (9.6")
Data Matrix	.254 mm	10 mil	50 mm (2.0")	95 mm (3.7")	45 mm (1.8")
	.381 mm	15 mil	35 mm (1.4")	160 mm (6.3")	125 mm (4.9")
	.508 mm	20 mil	40 mm (1.6")	260 mm (10.2")	220 mm (8.7")

* Depth of field information is for reference only. Actual values may vary depending on testing conditions.

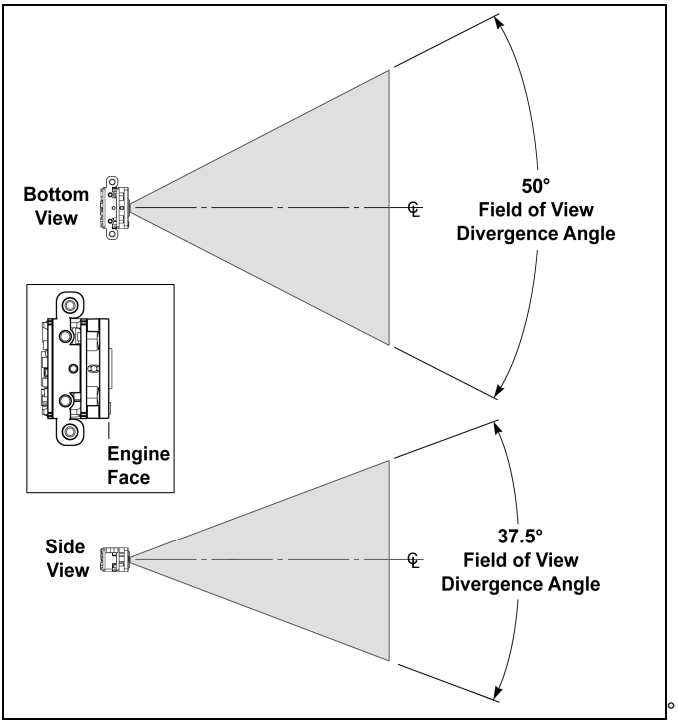


Figure 19. Field of View, Divergence Angle

Specifications are subject to change without notice.

	IS4920 Engine
Operational	
Light Source:	Four, 650 nm Red **L**ight **E**mitting **D**iode LED
Depth of Field:	25 mm – 310 mm (1.0″ to 12.2″) for 0.330 mm (13 mil) 1D Bar Codes *See page 34 for additional information.*
Field of View:	50° Horizontal
	37.5° Vertical
Scan Area:	118.4 mm x 86.2 mm (4.7″ x 3.4″) at 127 mm (5.0″) from the Engine Face
	236.8 mm x 172.4 mm (9.3″ x 6.8″) at 254 mm (10.0″) from the Engine Face
Rotation Sensitivity:	360° Around the Optical Axis
Minimum Element Width:	.10 mm (4.0 mil) 1D
	.254 mm (10 mil) 2D, Data Matrix
Resolution:	1.2 mega pixels (1280 x 960)
Symbologies Supported:	All standard 1D and 2D Bar Codes; Optional OCR fonts.
Print Contrast:	20% Minimum
Mechanical	
Dimensions:	See pages 9 - 11 for detailed specifications.
Weight:	< 14 g (.494 oz.)
Termination:	12-Pin, Molex FFC/FPC Connector (Molex P/N 52559-1252) See page 41 for engine pinouts.
See page 47 for Flex Cable specifications.	
Mounting:	See pages 9 - 11 for detailed specifications.
Keying Location:	See pages 9 - 11 for detailed specifications.

** Contact a customer service representative at 1-800-ID-METRO or 1-800-436-3876 for information on available decoding software.*

FFC/FPC is a trademark of Molex, Inc., all rights reserved.

Specifications are subject to change without notice.

	IS4920 Engine
Electrical	
Engine Input Voltage:	3.3VDC ~ 5.5VDC
Typical Operating Current:	235 mA (continuous scan mode, VIN=3.3V)
Peak Operating Current:	400 mA (typical VIN=3.3V)
Idle Current:	160 mA (typical VIN=3.3V)
Sleep Current:	65 mA (typical VIN=3.3V)
Suspend Current (USB):	600 µA (typical VIN=3.3V)
See pages 50 - 51 for regulatory compliance information.	
Environmental	
Operating Temperature:	0°C to 40°C (32°F to 104°F)
Storage Temperature:	-20°C to 70°C (-4°F to 158°F)
See page 19 for additional information on thermal considerations.	
Humidity:	5% to 95% relative humidity, non-condensing
Light Levels:	0 - 110,000 Lux
Shock:	5 ft. (1.5 m)
Vibration Protection:	7G, 10 – 500 Hz
Contaminants:	See page 15.

Specifications are subject to change without notice.

Detailed IS4920 Electrical Specifications

Absolute Maximum Ratings			
Signal	**Signal Description**	**MIN**	**MAX**
Vinput	Voltage Applied to Any input pin (except D+ and D-) *	-0.3V	5.5V
Voutput	Voltage Applied to Any output pin **	-0.3V	VIN + .3V

** For USB version, Voltages on D+ and D- signal must conform to USB Specification*
*** Voutput must be less than 5.5V for all pins*

DC Operating Voltages			
Signal	**Signal Description**	**MIN**	**MAX**
VIN	Operating Voltage	3V	5.5V
VIH(1)	Input High (RX, CTS)	2.5V	
VIL(1)	Input Low (RX, CTS)		.8V
VIH(2)	Input High (TTL_INV, nWake)	.8*VIN	
VIL(2)	Input Low (TTL_INV, nWake)		.8V
VIH(3)	Input High (Trigger)	.8*VIN	
VIL(3)	Input Low (Trigger)		.25V
VOH(1)	Output High Voltage (TX,RTS)	.8*VIN	
VOL(1)	Output Low Voltage (TX,RTS)		.14*VIN
VOH(2)	Output High Voltage (nBeeper, nGoodRead)	***	5.5V
VOL(2)	Output Low Voltage (nBeeper, nGoodRead)		.55V
VOH(3)	Output High Voltage (Power down)	***	5.5V
VOL(3)	Output Low Voltage (Power down)		.2V

**** PWRDWN, nGoodRead, and nBeeper are open drain outputs w/ 100K pull ups to VIN. Actual VOH will be determined by the parallel resistance of the 100K pull up and any external impedances*

Current Draw			
Signal	**Signal Description**	**VIN = 3.3V**	**VIN = 5V**
Continuous Scan mode	Average current draw during continuous scan mode (Note 4)	235mA	175mA
Idle	Average current draw while in idle mode	160mA	120mA
Sleep	Average current draw while in sleep mode	65mA	60mA
Suspend Mode (USB)	Average current draw in USB suspend (USB version only)	600µA	650µA

Current Waveforms

The following waveforms show typical current signature for the IS4920 (USB version) in various operating modes. Note, for all of the following waveforms, VIN = 3.3V and the output signals Beep and Good Read are pulled high externally through 10K resistors. Thus, these waveforms only account for the current drawn by the IS4920 circuitry and does not show additional current required for driving the LED or Beeper.

The IS4920 series engines do not have current limiting fuses.

Care must be taken on the host side to prevent against over current conditions that could potential damage the host system.

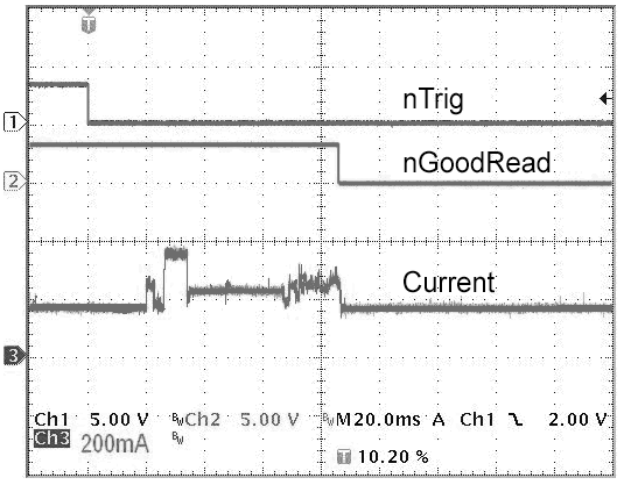


Figure 20. Single Image Decode current waveform (from idle state)

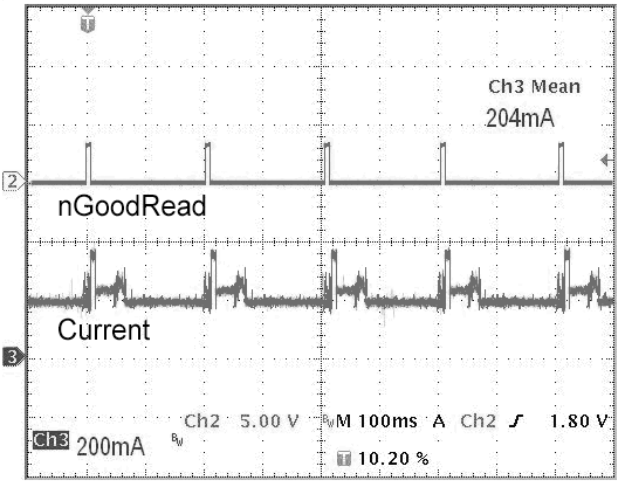


Figure 21. Continuous Image Decode current waveform (I_ave = 204mA)

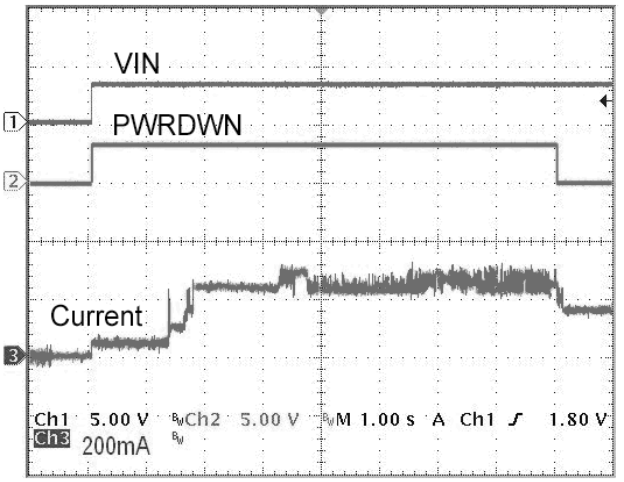
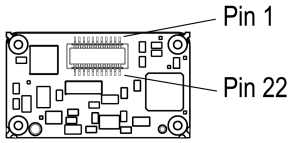
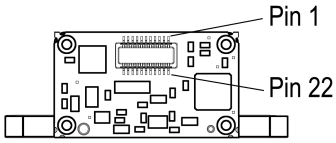


Figure 22. Power Up / Boot Up current waveform

Imaging Engine Interface Connector



IS4910-00
Side View



IS4910-01 / IS4910-02
Side View

Figure 23. Imaging Engine Interface Connector

Pin	Signal Name	Function
1	Aimer	High enables Targeting LED (Input)
2	Illum_On	High forces on Illumination LEDs (Input), Wake up Scanner
3	Trigger	Controls Integration and Illumination in Snapshot mode (Input)
4	SDA	I^2C data (Bi-Directional) – Devices Functions as Auxiliary Devices
5	SCL	I^2C clock (Bi-Directional) – Devices Function as Auxiliary Devices
6	VLED	Voltage Supply for Targeting and Area LEDs (3V - 5.5V)
7	D0	Pixel Data0 (LSB) (Output)
8	Vimager	Camera Voltage (3.1V - 3.5V)
9	D1	Pixel Data1 (Output)
10	D2	Pixel Data2 (Output)
11	D3	Pixel Data3 (Output)
12	PCLK	Pixel Clock (Output)
13	D7	Pixel Data7 (Output)
14	D6	Pixel Data6 (Output)
15	D5	Pixel Data5 (Output)
16	D4	Pixel Data4 (Output)
17	VSYNC	Vertical Sync (Output)
18	HSYNC	Horizontal Sync (Output)
19	GND	Power and Signal ground
20	Reserved	Terminate with Resistor, Pulled Low, or Leave Unconnected
21	GND	Power and Signal Ground
22	NC	No Connection

Specifications are subject to change without notice.

** In the Phillips I^2C specification auxiliary is defined as slave.*

Flex Cable Pinout – Imaging Engine Connection

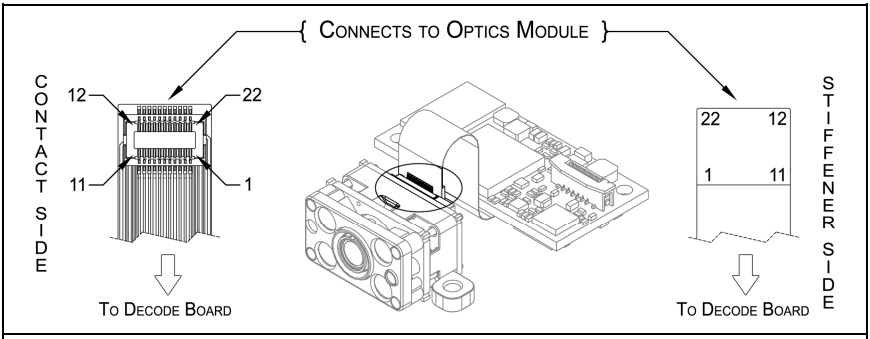


Figure 24.Flex Cable Pinout (Imaging Engine Connector End)

Pin	Signal Name	Function
1	Aimer	High enables Targeting LED (Input)
2	Illum_On	High forces on Illumination LEDs (Input), Wake up Scanner
3	Trigger	Controls Integration and Illumination in Snapshot mode (Input)
4	SDA	I^2C data (Bi-Directional) – Devices Functions as Auxiliary Devices
5	SCL	I^2C clock (Bi-Directional) – Devices Function as Auxiliary Devices
6	VLED	Voltage Supply for Targeting and Area LEDs (3V - 5.5V)
7	D0	Pixel Data0 (LSB) (Output)
8	Vimager	Camera Voltage (3.1V - 3.5V)
9	D1	Pixel Data1 (Output)
10	D2	Pixel Data2 (Output)
11	D3	Pixel Data3 (Output)
12	PCLK	Pixel Clock (Output)
13	D7	Pixel Data7 (Output)
14	D6	Pixel Data6 (Output)
15	D5	Pixel Data5 (Output)
16	D4	Pixel Data4 (Output)
17	VSYNC	Vertical Sync (Output)
18	HSYNC	Horizontal Sync (Output)
19	GND	Power and Signal ground
20	Reserved	Terminate with Resistor, Pulled Low, or Leave Unconnected
21	GND	Power and Signal Ground
22	NC	No Connection

Specifications are subject to change without notice.

Flex Cable Pinout – Decode Board Connection

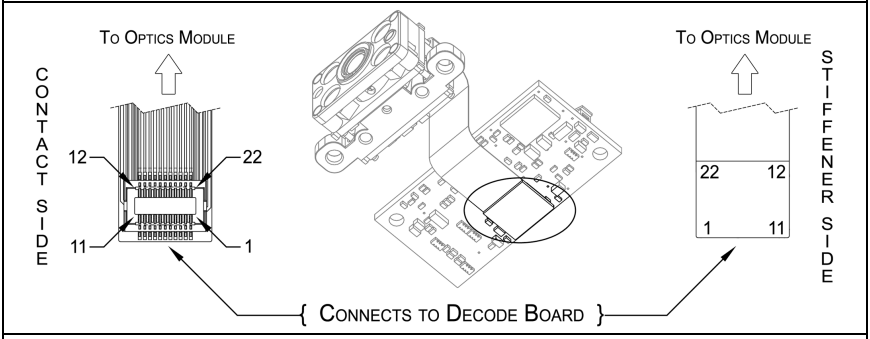
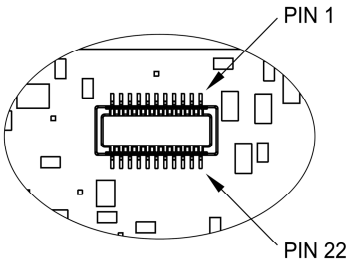


Figure 25. Flex Cable Pinout (Decode Connector End)

Pin	Signal Name	Function
1	GND	Power and Signal Ground
2	Reserved	Terminate with resistor, Pulled low, or Leave Unconnected
3	GND	Power and Signal Ground
4	HSYNC	Horizontal Sync (Output)
5	VSYNC	Vertical Sync (Output)
6	D4	Pixel Data4 (Output)
7	D5	Pixel Data5 (Output)
8	D6	Pixel Data6 (Output)
9	D7	Pixel Data7 (Output)
10	PCLK	Pixel Clock (Output)
11	NC	No Connection
12	D3	Pixel Data3 (Output)
13	D2	Pixel Data2 (Output)
14	D1	Pixel Data1 (Output)
15	Vimager	Camera Voltage (3.1V - 3.5V)
16	D0	Pixel Data0 (LSB) (Output)
17	VLED	Voltage supply for Targeting and Area LEDs (3V - 5.5V)
18	SCL	I^2C clock (Bi-Directional) – Devices Function as Auxiliary Devices
19	SDA	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices
20	Trigger	Controls Integration and Illumination in Snapshot Mode (Input)
21	Illum_On	High Forces on Illumination LEDs (Input)
22	Aimer	High Enables Targeting LED (Input)

Specifications are subject to change without notice.

Decode Board (USB & TTL) Interface Connector



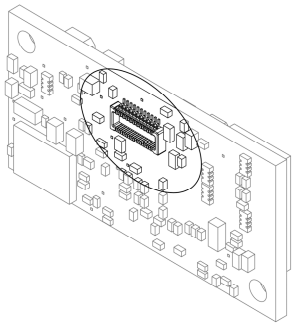


Figure 26. Figure 27. Decode Board Interface Connector

Pin	Signal Name	Function
1	GND	Power and Signal Ground
2	Reserved	Terminate with resistor, Pulled low, or Leave Unconnected
3	GND	Power and Signal Ground
4	HSYNC	Horizontal Sync (Output)
5	VSYNC	Vertical Sync (Output)
6	D4	Pixel Data4 (Output)
7	D5	Pixel Data5 (Output)
8	D6	Pixel Data6 (Output)
9	D7	Pixel Data7 (Output)
10	PCLK	Pixel Clock (Output)
11	NC	No Connection
12	D3	Pixel Data3 (Output)
13	D2	Pixel Data2 (Output)
14	D1	Pixel Data1 (Output)
15	Vimager	Camera Voltage (3.1V - 3.5V)
16	D0	Pixel Data0 (LSB) (Output)
17	VLED	Voltage supply for Targeting and Area LEDs (3V - 5.5V)
18	SCL	I^2C clock (Bi-Directional) – Devices Function as Auxiliary Devices
19	SDA	I^2C Data (Bi-Directional) – Devices Function as Auxiliary Devices
20	Trigger	Controls Integration and Illumination in Snapshot Mode (Input)
21	Illum_On	High Forces on Illumination LEDs (Input)
22	Aimer	High Enables Targeting LED (Input)

Specifications are subject to change without notice.

Decode Board (USB) Output to Host Connector

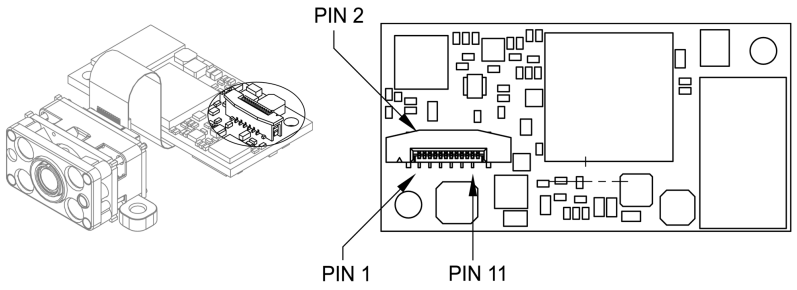


Figure 28.Decode Board (USB) Output Connector

Pin	Signal Name	Function
1	N/C	No Connection
2	V_{in}	Power: Supply voltage input (3V to 5.5V)
3	GND	Ground: Power and signal ground.
4	D-	Input: USB D- Signal
5	<reserved>	Pin Function Reserved.
6	D+	Input: USB D+ Signal
7	<reserved>	Pin Function Reserved.
8	PWRDWN	Output: active high = IS4920 is in power down mode.
9	nBEEPER	Output: active low signal capable of sinking current.
10	nGoodRead	Output: active low signal for sinking current (Good Read).
11	nWAKE	Input: Wakes scanner from power-down or sleep mode.
12	nTrig	Input: Signal used as trigger input to activate the IS4920

Specifications are subject to change without notice.

Decode Board (TTL) Output to Host Connector

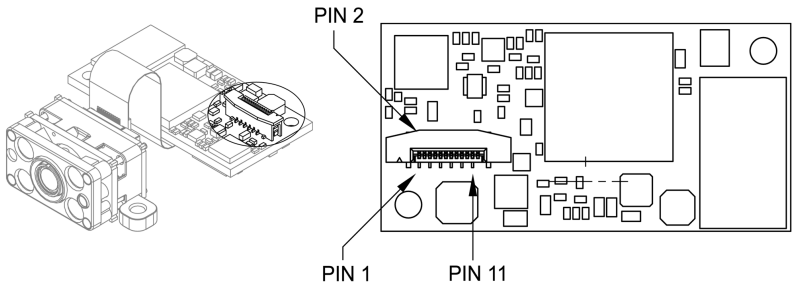


Figure 29.Decode Board (TTL) Output Connector

Pin	Signal Name	Function
1	232INV	Input: TTL RS232 polarity control with 68k ohm pull-up.
2	V_{in}	Power: Supply voltage input (3V to 5.5V)
3	GND	Ground: Power and signal ground.
4	(n)RxD	Input: TTL Level RS232 Receive data input.
5	(n)TxD	Output: TTL Level RS232 transmit data.
6	(n)CTS	Input: TTL level Clear to Send.
7	(n)RTS	Output: TTL level RS232 Request to Send.
8	PWRDWN	Output: active high = IS4920 is in power down mode.
9	nBEEPER	Output: active low signal capable of sinking current.
10	nGoodRead	Output: active low signal for sinking current (Good Read).
11	nWAKE	Input: Signal used to bring scanner out of power-down.
12	nTrig	Input: Signal used as trigger input to activate the IS4920

Specifications are subject to change without notice.

Dimensions

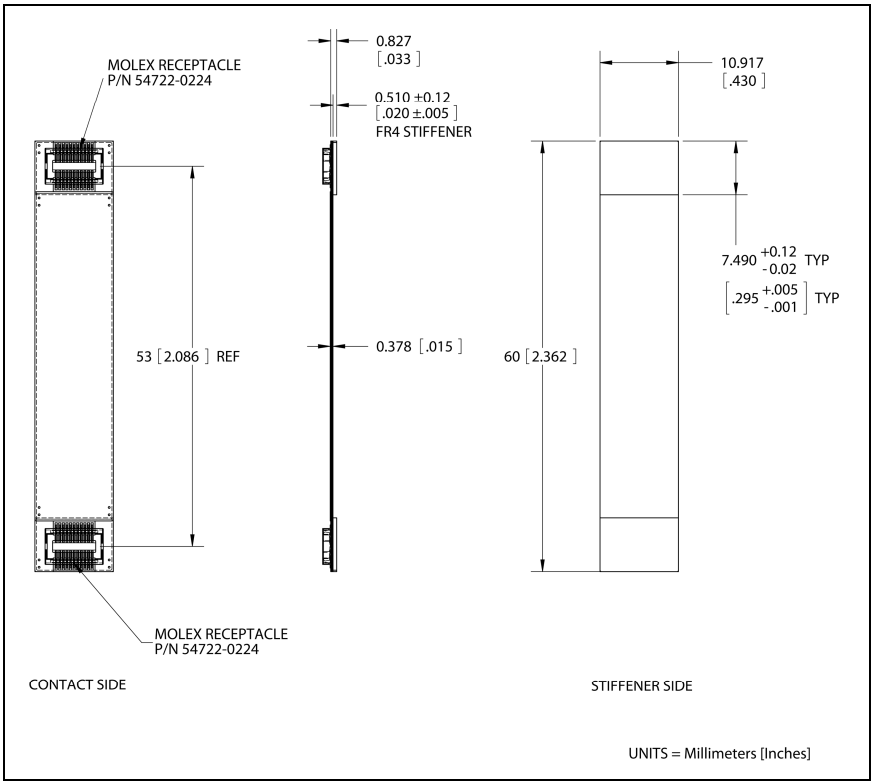


Figure 30. Flex Cable Dimensions, P/N 77-77104

See installation warning on page 48.

Specifications are subject to change without notice.

Installation Notes

1. **Warning!**

   The flex cable must be installed in the orientation shown below in *Figure 31* & *Figure 32*. If the cable is incorrectly installed, the engine can be damaged and the warranty voided.

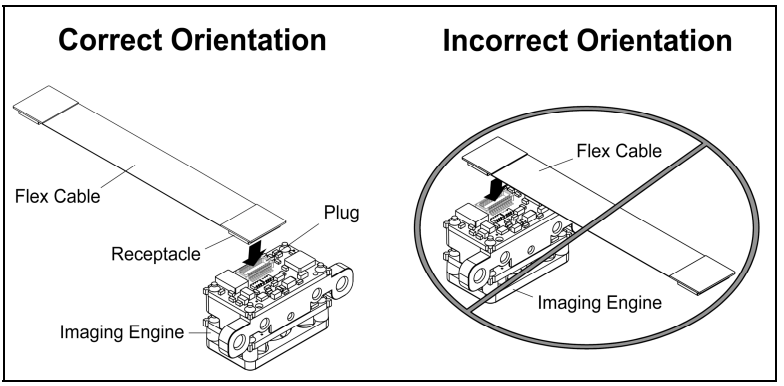


Figure 31. Flex Cable Orientation – Imaging Engine

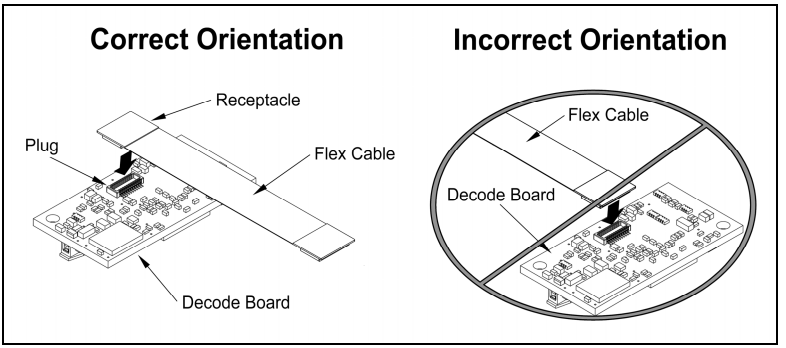


Figure 32. Flex Cable Orientation – Decode Board

2. Proper installation of the flex cable is essential for engine performance. When installing the flex cable, verify that the flex cable receptacle is fully seated in the engine plug. To achieve a full connection, ensure that the alignment of the mating parts is not angled during installation. Flex cable P/N 77-77104 is designed with universal ends.

3. Once installed, it is recommended that the flex cable be connected and routed securely in the enclosure to prevent loss of connection.

Safety

The IS4920 Series area imaging engines are designed to meet the requirements of IEC Class 1 in accordance with IEC 60825-1:1993+A1+A2. IEC Class 1 is defined as follows:

The specifications required for agency approval are not obtainable until the IS4920 area-imaging engine is used in its final configuration. Metrologic Instruments, Inc. is unable to fulfill these requirements because the imaging engine will operate differently depending upon where the engine is used as a component.

If the product containing the IS4920 engine is to be used other than the United States, **the manufacturer who incorporates the imaging engine into their product is responsible for** fulfilling any regulatory compliance requirements for that country. Refer to one of the following sections for further explanation.

Europe

The CE Mark is required on products that incorporate the IS4920 series engine if the products are to be imported into European Economic Area (EEA) countries. Use of the CE Mark requires compliance with directives and standards dependent upon the type of product. Information may be found at http://europa.eu.int/comm/enterprise/newapproach/.

LED Safety

IEC 60825-1:1993+A1+A2,
EN 60825-1:1994+A1+A2
"Safety of LED products"

Compliance with either of the standards listed above is required for the product to bear the CE mark.

Note: Non EEA countries may impose additional testing/certification requirements.

EMC

All combinations of IS4920 area imaging engines and associated electronics will require certification of compliance with the European EMC Directive. EMC compliance of finished products in Europe can be accomplished by the following method:

- The manufacturer may certify to the EC's Electromagnetic Compatibility Directive 89/336/EEC. Compliance is required for the product to bear the CE Mark.

Note: Non EEA countries may impose additional testing/certification requirements.

The IS4920 series area imaging engine is designed to meet EN55022 Radiated Class B emission limits. The engine was installed in a representative system and tested for compliance.

Electrical Safety

The IS4920 engines are built to conform to the European Low Voltage Directive 73/23/ EEC.

United States

EMC

All combinations of imaging engines and associated electronics will require testing to insure compliance with the following Federal Communications Commission regulation: 47 CFR Part 15

Note: When using the imaging engine with RF equipment, modems, etc. may require examination(s) to the standard(s) for the specific equipment combination. It is the manufacturers' responsibility to comply with the applicable federal regulation(s).

The IS4920 series area imaging engine is designed to meet EN55022 Radiated Class B emission limits. The engine was installed in a representative system and tested for compliance.

Canada

EMC

Products meeting FCC 47 CFR Part 15 will meet Industry Canada interference-causing equipment standard for digital apparatus, ICES-003. Additional testing is not required.

A written notice indicating compliance must accompany the apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. The notice may be in the form of a statement included in the user's manual if, because of insufficient space or other restrictions, it is not feasible to affix a label to the apparatus.

EMI

The IS4920 consists of a 400MHz processor running a 100MHz SDRAM bus and a camera interface capable of image transfer up to 48MHz. The IS4920 series engine was designed to meet EN55022 Radiated Class B emission limits. Using the system shown below, the IS4920 was able to meet these requirements with an input voltage VIN = 3.3V and the camera interface operating at its maximum frequency of 48MHz.

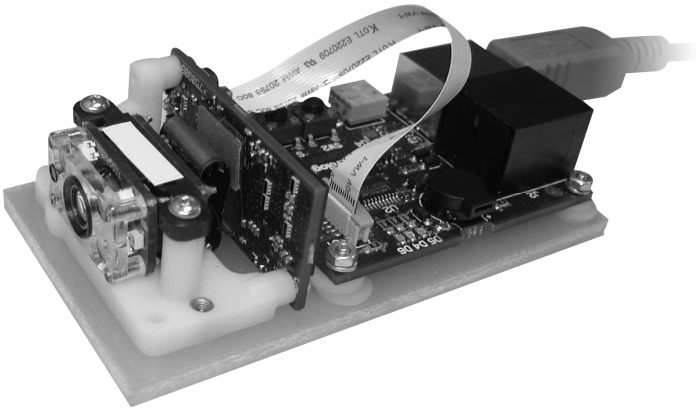


Figure 33. IS4920 EMI Test System

Components used in IS4920 EMI test system	
Part Number (Metrologic p/n)	**Part Description/Function**
IS4920-USB	Imaging decode engine
77-77104A	Imager to Decode Flex cable assembly (shielded)
77-77095A	IS4920 test adapter board
52-52828	USB cable (A to B)
19-00329	12pin Host Flex cable

Given the Decoding platform architecture described above, it is follows that harmonics of 48MHz and 100MHz were most prevalent.

LIMITED WARRANTY

The IS4920 series area imaging engines are manufactured by Metrologic at its Blackwood, New Jersey, U.S.A. facility and its Suzhou, China facility. The IS4920 series imaging engines have a two (2) year limited warranty from the date of manufacture. Metrologic warrants and represents that all IS4920 imaging engines are free of all defects in material, workmanship and design, and have been produced and labeled in compliance with all applicable U.S. Federal, state and local laws, regulations and ordinances pertaining to their production and labeling.

This warranty is limited to repair, replacement of product or refund of product price at the sole discretion of Metrologic. Faulty equipment must be returned to one of the Metrologic repair facilities: Blackwood, New Jersey, U.S.A; Madrid, Spain; or Suzhou, China. To do this, contact Metrologic's Customer Service/Repair Department to obtain a Returned Material Authorization (RMA) number.

In the event that it is determined the equipment failure is covered under the warranty, Metrologic shall, at its sole option, repair the product or replace the product with a functionally equivalent unit and return such repaired or replaced product without charge for service or return freight, whether distributor, dealer/reseller, or retail consumer, or refund an amount equal to the original purchase price.

This limited warranty does not extend to any product which, in the sole judgment of Metrologic, has been subjected to abuse, misuse, neglect, accident, negligence, improper installation, handling or storage, or is damaged as a result of (A) a failure to follow instructions contained in this manual or other documentation provided with the product; (B) modification or alteration; (C) excessive voltage or current supplied to or drawn from the interface connections; (D) battery leakage; or (E) water or other liquids. The warranty is void if the product is not encased in a properly designed enclosure (sealed to: (a) prevent infiltration by airborne contaminants; (b) protect against ESD, humidity and mechanical shocks; and (c) be non-condensing); the product is used with any peripherals not manufactured or sold by Metrologic (including, but not limited to, cables and power supplies) or the product is modified or disassembled by anyone other than Metrologic's repair department or authorized repair centers. For additional information on enclosure design, see pages 14 to 16 of the Installation Guide.

EXCEPT AS TO TITLE, THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR GUARANTEES, EITHER EXPRESS OR IMPLIED, AND SPECIFICALLY EXCLUDES, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE UNDER THE UNIFORM COMMERCIAL CODE, OR ARISING OUT OF CUSTOM OR CONDUCT. THE RIGHTS AND REMEDIES PROVIDED HEREIN ARE EXCLUSIVE AND IN LIEU OF ANY OTHER RIGHTS OR REMEDIES. IN NO EVENT SHALL METROLOGIC BE LIABLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES, INCIDENTAL DAMAGES, DAMAGES TO PERSON OR PROPERTY, OR EFFECT ON BUSINESS OR PROPERTY, OR OTHER DAMAGES OR EXPENSES DUE DIRECTLY OR INDIRECTLY TO THE PRODUCT, EXCEPT AS STATED IN THIS WARRANTY. IN NO EVENT SHALL ANY LIABILITY OF METROLOGIC EXCEED THE ACTUAL AMOUNT PAID TO METROLOGIC FOR THE PRODUCT. METROLOGIC RESERVES THE RIGHT TO MAKE ANY CHANGES TO THE PRODUCT DESCRIBED HEREIN.

This limited warranty extends only to the first end-user of the product and is non-transferable.

WORLDWIDE HEADQUARTERS,
Metrologic Instruments, Inc.
90 Coles Rd.
Blackwood, NJ 08012-4683
Tel: 856-228-8100
Fax: 856-228-6673
Email: info@metrologic.com

METROLOGIC THE AMERICAS HEADQUARTERS
METROLOGIC THE AMERICAS
1571 Imperial Way Suite B
West Deptford, NJ 08066
Tel: 800-ID-METRO (800-436-3876)
Fax: 856-537-6474
Email: info@us.metrologic.com

MTLG AUTO ID INSTRUMENTS (SHANGHAI) CO., LTD
Suzhou Sales Office
BLK A, Room# 03/03-04
No.5 Xinghan Street, Xinsu Industrial Square
China-Singapore
Suahou Industrial Park, Suzhou, PRC
Tel: 86-512-67622550
Fax: 86-512-67622560
Email: info@cn.metrologic.com

METROLOGIC EUROPEAN REPAIR CENTER (MERC)
Metrologic Eria Ibérica, SL
Julian Camarillo 29, D-1
28037 Madrid
Tel: +34 913 272 400
Fax: +34 913 273 829
Email: info@es.metrologic.com

PATENTS

This METROLOGIC product may be covered by, but not limited to, one or more of the following U.S. Patents:

U.S. Patent No.: 7,086,595; 7,128,266; 7,213,762; 7,216,810; 7,225,988; 7,225,989

No license right or sublicense is granted, either expressly or by implication, estoppel, or otherwise, under any METROLOGIC or third party intellectual property rights (whether or not such third party rights are licensed to METROLOGIC), including any third party patent listed above, except for an implied license only for the normal intended use of the specific equipment, circuits, and devices represented by or contained in the METROLOGIC products that are physically transferred to the user, and only to the extent of METROLOGIC'S license rights and subject to any conditions, covenants and restrictions therein.

Other worldwide patents pending.

A

Aiming 20, 36
Ambient Light 20
Ambient Temperture 18
Area Illumination 5
Assembly 3, 4

B

Bar Code 34, 35
Bus 20

C

Cable 18, 35
Camera Aperture 3, 4, 5, 16
CMOS 20
CMOS sensor 1
Connector 5, 6, 7, 12, 35, 41, 42, 43, 44, 45, 46, 47, 48
Contaminants 15, 36, 53
Contrast 35
Current 36
Customer Service 35, 53

D

Depth of Field 34, 35
Divergence Angle 17, 34

E

Electrical
  Current Draw 38
  DC voltages 37
  Max Ratings 37
Electrical Specification 36, 50
Electrostatic Discharge 15, 36, 53
EMC 50, 51
Enclosure 15–17, 47, 48, 53

F

Field of View 16, 34, 35
First*Flash*® 1, 5, 20
Flex Cable ..... *See* Cable

G

Ground 15, 41, 42, 43, 44, 45, 46

H

Humidity 15, 36, 53

I

Illumination 5, 16, 17, 36, 41, 42, 43, 44, 45, 46
Image engine 2
Imager 5
Imaging Engine 5
Imaging Sensor 20
Input 36, 41, 42, 43, 44, 45, 46

K

Keying 5
Keying Location 9–14

L

Label 8
Light Levels 36
Light Pipe 5
Light Source 35
Limited Warranty 53

M

Mega-pixel 1
Mode
  Snapshot 20, 36
  Video 20, 36
Model 2
Mounting 2, 3, 4, 5, 6, 7, 9–14

O

Optical Clearance 17
ORC
  Fonts 1
  MICR 1
  ORC-A 1
  ORC-B 1
Output 41, 42, 43, 44, 45, 46

P

Part Number 2
PCLK 20
Pin 41, 42, 43, 44, 45, 46
Pixel 20, 41, 42, 43, 44, 45, 46
Plug 35, 41, 42, 43, 44, 45, 46

Power 18
Power Supply 18

R

Receptacle 20, 47, 48
Regulatory Compliance ... 49, 50, 51
Resolution 35
RMA 53

S

Self-Tapping Screw 2, 5, 9–14
Sensor 20
Serial Label 8
Service 53
Shock 36, 47, 48
Signal 20–33, 41, 42, 43, 44, 45, 46
Signals 21, 22, 37
Snapshot Mode 20, 36
SwiftDecoder 1

T

Targeting ... 5, 41, 42, 43, 44, 45, 46
Temperature 36
Thermal Temperature 19
Threaded Inserts 11
Timing 29
Torque 9–14
Trigger 41, 42, 43, 44, 45, 46

V

Video Mode 20, 36
Voltage ... 36, 41, 42, 43, 44, 45, 46, 50, 51

W

Warranty 53
Watt(s) 50
Weight 35, 36
Window
  coatings 16
  materials 16
  specifications 16
  transmission 16

WORLDWIDE HEADQUARTERS

Metrologic Instruments, Inc.

90 Coles Rd. Blackwood, NJ 08012-4683 ▪ Email: info@metrologic.com
Customer Service Tel: 1-800-ID-METRO ▪ Corporate Tel: 856-228-8100
Fax: 856-228-6673 (Sales) ▪ 856-228-1879 (Marketing) ▪ Fax: 856-228-0653 (Legal/Finance)

USA
Omniplanar
Tel: 856.537.6100
Fax: 856.537.6116
Email: info@omniplanar.com

USA
NOVODisplay
Tel: 856.537.6139
Fax: 856.537.6116
Email: info@NOVOdisplay.com

METROLOGIC - THE AMERICAS

USA
Metrologic USA - *Headquarters*
Tel: 1.856.537.6400
Fax: 1.856.537.6474
Email: info@us.metrologic.com

Mexico
Metrologic Mexico, S.A. DE C.V.
Tel: 55.5365.6247
Fax: 55.5362.2544
Email:
info@mx.metrologic.com

South America
Metrologic do Brasil Ltda.
Tel: 52.55.11.5182.7273
Fax: 52.55.11.5182.7198
Email: info@sa.metrologic.com

South America
Metrologic South America
Tel: 1.239.642.1958
Fax: 1.239.642.1959
Email: info@sa.metrologic.com

METROLOGIC - EMEA

Central Europe
Metrologic Instruments GmbH
Headquarters
Tel: 49-89-89019-0
Fax: 49-89-89019-200
Email: info@de.metrologic.com

France
Metrologic Eria France SA
Tel: +33 (0) 1 48.63.78.78
Fax: +33 (0) 1 48.63.24.94
Email: info@fr.metrologic.com

METROLOGIC - EMEA

Spain
Metrologic Eria Iberica, SL
Tel: +34 913 272 400
Fax: +34 913 273 829
Email: info@es.metrologic.com

Russia
Metrologic Instruments LLC
Tel: +7 (495) 737 7273
Fax: +7 (495) 737 7271
Email: info@ru.metrologic.com

Italy
Metrologic Instruments Italia
Tel: +39 0 57 6511978 or
+39 051 651 1978
Fax: +39 0 51 6521337
Email: info@it.metrologic.com

Poland
Metrologic Instruments Poland
Tel: +48 (22) 545 04 30
Fax: +48 (22) 545 04 31
Email: info@pl.metrologic.com

United Kingdom
Metrologic Instruments UK Limited
Tel: +44 (0) 1256 365900
Fax: +44 (0) 1256 365955
Email: info@uk.metrologic.com

METROLOGIC – APAC

Asia
Metrologic Asia (Pte) Ltd
Headquarters
Tel : (65) 6842-7155
Fax : (65) 6842-7166
Email: info@sg.metrologic.com

China
Suzhou Sales Office
Headquarters
Tel: 86-512-67622550
Fax: 86-512-67622560
Email: info@cn.metrologic.com

METROLOGIC – APAC

Austrialia
Metrologic Australia
Tel: 61 2 9652 2726
(international)
Tel: 02 9816 6470 (local)
Tel: 1 800 99 88 38 (Australia)
Email:
kmason@au.metrologic.com

China
Beijing Sales Office
Tel/Fax: 86 10 82253472
Email: info@cn.metrologic.com

China
Chengdu Sales Office
Tel/Fax: 86 28 86200109
Email: info@cn.metrologic.com

China
Guangzhou Sales Office
Tel: 86-20-38823476
Fax: 86-20-38823477
Email: info@cn.metrologic.com

India
India Sales Office
Tel: +91 80 41256718
Fax: +91 80 41256719
Email: info@in.metrologic.com

Korea
Korea Sales Office
Tel: 82-2-6205-5379
Fax: 82-2-3444-3980
Email:
Scott.lee@kr.metrologic.com

Japan
Metrologic Japan Co., Ltd.
Tel: 81-3-3839-8511
Fax: 81-3-3839-8519
Email: info@jp.metrologic.com

Thailand
Metrologic Thailand
Tel: +662-610-3787
Fax: +662-610-3601
Email:
tawan.jandang@th.metrologic.com

China
Shanghai
Tel: 86-21-58356616
Fax: 86-21-58358873
Email: info@cn.metrologic.com

December 2007

Printed in USA